RECLAMATION

*Managing Water in the West*

## Draft Environmental Assessment

# Placer County Water Agency Water Transfer to San Diego County Water Authority



**EA-09-__** **June 2009**

# Contents

# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| af | acre-feet |
| AFRP | Anadromous Fish Restoration Program |
| Bank Program | Drought Water Bank Program |
| Bay-Delta | San Francisco Bay/Sacramento-San Joaquin Delta |
| BO | Biological Opinion |
| CALFED | California Federal |
| CDEC | California Data Exchange Center |
| CFR | California Federal Regulations |
| cfs | cubic-feet per second |
| COA | Coordinated Operations Agreement |
| Corps | U.S. Army Corps of Engineers |
| CVP | Central Valley Project |
| CVPIA | Central Valley Project Improvement Act |
| CVRWQCB | Central Valley Regional Water Quality Control Board Basin Plan |
| CWA | Clean Water Act |
| DFG | Department of Fish and Game |
| DPS | Distinct Population Segment |
| DWB | Drought Water Bank |
| DWR | Department of Water Resources |
| EA | Environmental Assessment |
| EFH | Essential Fish Habitat |
| E/I ratio | Export/Import ratio |
| EIS | Environmental Impact Study |
| EO | Executive Order |
| ESA | Endangered Species Act |
| FERC | Federal Energy Regulatory Commission |
| FRWPA | Feather River Water Project Agency |
| FWS | U.S. Fish and Wildlife Service |
| ITAs | Indian Trust Assets |
| JPOD | Joint Point of Diversion |
| LAR | Lower American River |
| M&I | Municipal and Industrial |
| MF | Middle Fork |
| MFP | Middle Fork Project |
| MSFCMA | Magnuson-Stevens Fishery Conservation and Management Act |
| msl | mean sea-level |
| MWD | Metropolitan Water District of Southern California |
| NEPA | National Environmental Policy Act |
| NMFS | National Marine Fisheries Service |
| Non-CVP | Non-Central Valley Project |
| OCAP | Operations and Criteria Plan |
| PCWA | Placer County Water Agency |
| PG&E | Pacific Gas and Electric Company |
| PL | Public Law |

| | |
|---|---|
| RA | Refill Agreement |
| Reclamation | Bureau of Reclamation |
| ROD | Record of Decision |
| RWQCB | Regional Water Quality Control Board |
| SDCWA | San Diego County Water Authority |
| SFWPA | South Feather Water and Power Agency |
| SWP | State Water Project |
| SWRCB | State Water Resources Control Board |
| TAF | Thousand Acre-Feet |
| USEPA | U.S. Environmental Agency |
| WA | Warren Act |
| WQCP | Water Quality and Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary |
| YOY | Young-of-the-year |

# Chapter 1
# Introduction

This document is an Environmental Assessment (EA) for the Bureau of Reclamation (Reclamation) to execute a temporary Warren Act (WA) contract with San Diego County Water Authority (SDCWA) and execution of a refill agreement with Placer County Water Agency (PCWA) to facilitate a non-Central Valley Project (CVP) water transfer from the PCWA Middle Fork Project (MFP). This EA has been prepared by the U.S. Department of Interior, Bureau of Reclamation, to satisfy the requirements of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321 et seq.) and the Council of Environmental Quality's Regulations for Implementing Procedural Provisions of NEPA (40 CFR 1500-1508).

The EA describes the affected environment and the potential effects related to execution of the WA and refill agreement. The EA also identifies measures that have been incorporated into the design of the project to minimize or avoid project-related impacts.

This EA will serve as the appropriate environmental review document under NEPA, for Reclamation as the designated federal lead agency for this action.

## 1.1 Federal Action

The federal action is twofold: **1).** In response to the recent drought conditions and in order to move water to an area of high need, PCWA is proposing a temporary water transfer of 20,000 acre-feet (AF). This water will be transferred from PCWA's 2009 water supplies which are currently stored in PCWA's MFP reservoirs on the Rubicon and American Rivers to SDCWA for municipal and industrial (M&I) use within the SDCWA service area. To facilitate the transfer, Reclamation proposes to implement a WA contract for a total of up to 20,000 AF of PCWA water rights that may be stored in Folsom Reservoir until February 28, 2010, although all the water is planned for release before October 2009. If the water cannot be moved under the terms of the Warren Act Contract, the water will be lost to the contractor. **2).** Additionally, in order to protect Folsom Reservoir and the CVP from adverse water supply impacts due to the proposed water transfer, Reclamation requires that PCWA's 2009 agreement with SDCWA is conditioned upon execution of an agreement between Reclamation and PCWA establishing conditions on PCWA's refilling of its MFP Reservoirs (following the transfer).

## 1.2 Project Background

PCWA has implemented several temporary water sales and transfers over the past 25 years to enhance water supply, water quality, and environmental conditions. Temporary water sales and transfers have been advocated as a critically important mechanism to distribute water throughout California. In the August 28, 2000, Record of Decision (ROD) for the CALFED

Bay-Delta Program (CALFED) Final Programmatic Environmental Impact Statement/Environmental Impact Report, water transfers were identified as a key component of a long-term comprehensive plan to restore the ecological health and improve water management for beneficial uses of the San Francisco Bay/Sacramento-San Joaquin Delta (Bay-Delta) estuary system.

Water transfers and water sales have become an important component in SDCWA water supply. Provided the price is reasonable, transfers from other districts are pursued during dry years to supplement reduced contract deliveries. Transfers to SDCWA are used to supplement a water user's allocation.

Severe impacts from the water shortage caused by general drought conditions and reduced SWP deliveries to SDCWA and other agricultural districts within San Diego County compelled Governor Arnold Schwarzenegger to issue Executive Order S-06-08 on June 4, 2008, which proclaimed a condition of statewide drought. This Executive Order orders the California Department of Water Resources (DWR) to "[f]acilitate water transfers in 2008 to timely respond to potential emergency water shortages…" Importantly, the Governor also ordered "that the emergency exemptions in sections 21080(b)(3) and 21172 of the Public Resources Code shall apply to all activities and projects ordered and directed under this proclamation, to the fullest extent allowed by law."

State Government Code Section 8558 defines a "state of emergency" as "conditions of disaster of extreme peril to the safety of persons and property within the State caused by such conditions as …drought." These conditions exist within the SDCWA service area, and economic and social cost to the State will persist unless the situation is mitigated through water transfers and water sales such as that proposed here.

## 1.3 Warren Act

The WA (36 Stat. 925) of 1911 provides authorization for the Secretary of the Interior to enter into WA contracts with water purveyors to carry non-CVP water (i.e., water not developed as part of the CVP) through Federal facilities. Under Section 305 of the States Emergency Drought Relief Act of 1991 (106 Stat. 59), "Excess Storage and Carrying Capacity-Contracts," and Section 3408(c) of the Central Valley Project Improvement Act (106 Stat. 4728), "Contracts for additional storage and delivery of water." the Secretary is authorized to execute contracts with municipalities, public water districts and agencies, other Federal agencies, State agencies, and private entities pursuant to the WA. These contracts provide for the impounding, storage, and conveyance of non-CVP water for domestic, municipal, fish and wildlife, industrial, and other beneficial uses using any facilities associated with the CVP, which includes the Folsom Dam and Reservoir, and Natomas Dam and Lake Natoma.

## 1.4 Project Agencies and Related Facilities

The PCWA is a public agency created and existing pursuant to the provisions of the Placer County Water Agency Act (California Statutes 1957, Chapter 1234, as amended), and is empowered to enter into contracts to sell water for use outside of Placer County. PCWA

owns and operates the MFP, which includes French Meadows and Hell Hole Reservoirs ("MFP Reservoirs") and holds water rights for MFP pursuant to permits issued on Applications 18084, 18085, 18086, and 18087 by the State Water Rights Board, predecessor to the State Water Resources Control Board. Reclamation operates the CVP, of which Folsom Reservoir, located downstream of the Middle Fork Project, is a part.

**Placer County Water Agency**

PCWA was formed in 1957 for the purpose of developing and operating major water facilities in Placer County. The MFP was developed by PCWA and is currently operated by the Pacific Gas and Electric Company (PG&E)(**Figure 1-1**). The MFP is a multi-purpose project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and certain tributaries for irrigation, domestic and commercial purposes, and for the generation of electric energy. Principal features include two storage reservoirs and five diversion dams, five power plants, diversion and water transmission facilities, five tunnels, and related facilities. The power plants have a combined dependable generating capacity of 190,700 kilowatts. The two storage reservoirs, Hell Hole and French Meadows, have a combined capacity of 340,000 AF.

The MFP, developed and owned by PCWA, regulates flows along the Middle Fork American River. PCWA has direct diversion rights from the North Fork American River and two primary diversions: one near the proposed Auburn Dam site and one from Folsom Reservoir. Flows not diverted or consumptively used from the upper American River tributaries are realized as Folsom Reservoir inflow. Folsom Reservoir is located at the confluence of the North Fork and South Fork of the American Rivers, north of the City of Folsom, and is the uppermost boundary of the lower American River.

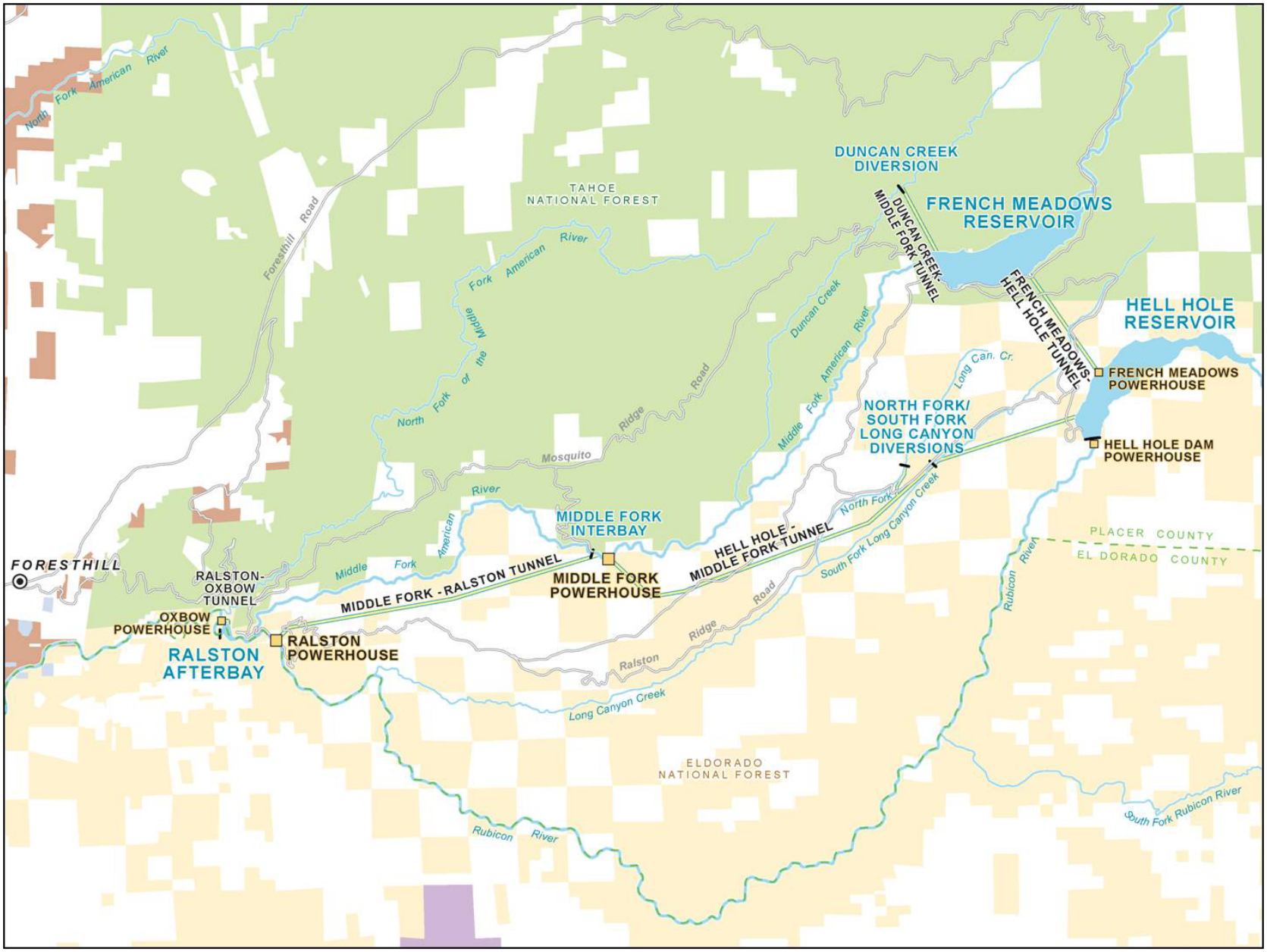


**Figure 1-1. Middle Fork Project**

**San Diego County Water Authority**

SDCWA was organized June 9, 1944 by the California State Legislature as a public agency to administer the region's Colorado River water rights. It operates under the County Water Authority Act, which is a part of the California State Water Code. Water from the Colorado River first arrived locally, in the new San Vicente Reservoir, in November 1947.

When SDCWA first began operations, it was concerned solely with securing a reliable imported water supply and then delivering it to the San Diego region. The agency did this by working with the Navy and federal Bureau of Reclamation to construct the first two pipelines linking San Diego County and the Colorado River Aqueduct, which is owned and operated by the Metropolitan Water District of Southern California (MWD).

After the second pipeline was completed in 1952, the SDCWA itself installed three more pipelines, leaving the region with five large-diameter pipelines that extend north-south throughout the county. These pipes are kept filled with water from the Colorado and from Northern California, via the State Water Project.

Since then, SDCWA, in conjunction with its 24 member agencies, has met its mission of providing San Diego County with a safe, reliable and cost-effective supply of imported water. Much of the agency's attention is devoted to issues surrounding the Sacramento-San Joaquin River Delta, an environmentally significant area that also is a water source for San Diego County and much of the rest of California. The SDCWA is encouraging legislation that will meet both environmental and water supply needs in the optimal fashion.

SDCWA wholesales imported water to its member agencies, which in turn deliver the water to individual homes and businesses throughout the county. The county's 2.7 million residents generally rely on imported water for 90 percent of their total supply in a typical year.

**Central Valley Project, California**

The proposed water sale from PCWA to SDCWA will use Folsom Reservoir and related features which are CVP facilities.

The CVP, initially authorized by Congress in the 1935 Rivers and Harbors Act, is a multi-purpose project operated and maintained by Reclamation that stores and conveys water from the Sacramento, San Joaquin, and Trinity River basins to the Sacramento and San Joaquin Valleys (**Figure 1-3**). The CVP reaches from the Cascade and Klamath Mountains near Redding in the north and some 500 miles south to the Tehachapi Mountains near Bakersfield. Designs for the CVP were motivated by a fear of floods and drought, and a desire to transport water from the northern end of the Central Valley to the drier southern end. The CVP was authorized for water supply, hydropower generation, flood control, navigation, fish and wildlife, recreation, and water quality control purposes.

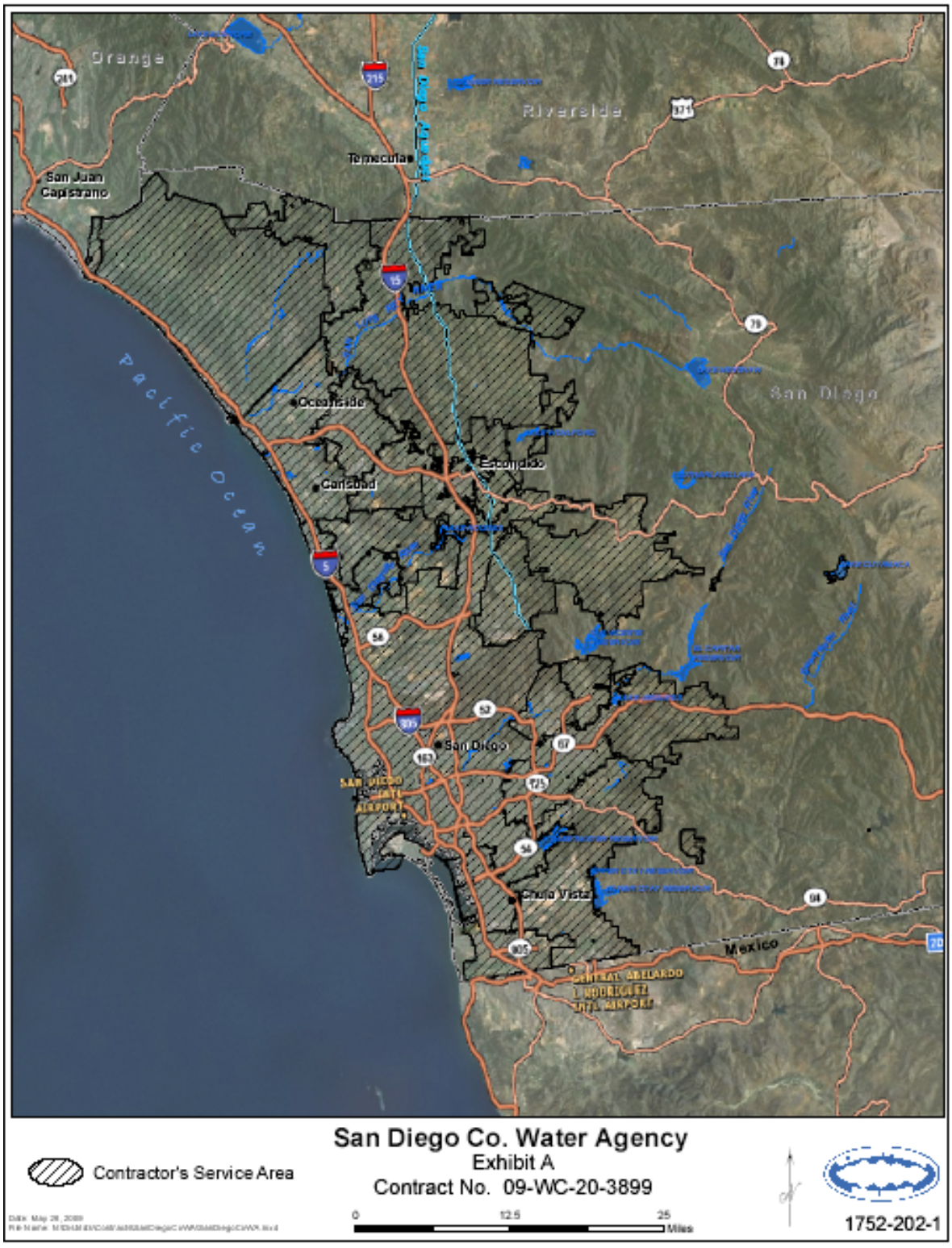


**Figure 1-2. San Diego County Water Authority**


**Figure 1-3**. Water Delivery Features

CVP facilities include 18 dams and reservoirs, 39 pumping plants, two pumping-generating plants, 11 power plants and 500 miles of major canals as well as conduits, tunnels, and related facilities. Today these CVP facilities annually deliver approximately seven million AF of water, and supply irrigation water to the Sacramento and San Joaquin Valleys, water to cities and industries in Sacramento and the east and south Bay Areas, and to fish hatcheries and wildlife refuges throughout the Central Valley.

**Folsom Dam and Reservoir**
Originally authorized in 1944 as a 355,000 AF flood control unit, Folsom Dam was reauthorized in 1949 as a 1,000,000 AF multiple-purpose facility. The U.S. Army Corps of Engineers (Corps) constructed Folsom Dam and transferred it to Reclamation for coordinated operation as an integral part of the CVP. Reclamation operates Folsom Dam and Reservoir for the purposes of flood control, meeting water contract obligations, providing instream flows in the lower American River for recreation and fisheries resources, and as a means of meeting Sacramento-San Joaquin Delta (Delta) water quality standards.

**Lake Natoma and Nimbus Dam**
Lake Natoma serves as the Folsom Dam afterbay and is contained by Nimbus Dam. Lake Natoma has a maximum storage capacity of 9,000 AF, and inundates approximately 500 acres. Lake Natoma is operated as a re-regulating reservoir that accommodates the diurnal flow fluctuations caused by the power peaking operations at Folsom Power Plant. Nimbus Dam, along with Folsom Dam, regulates water releases to the lower American River.

# Chapter 2
# Purpose and Need of Proposed Action

## 2.1 Project Purpose and Need

Due to water shortages related to current drought conditions, SDCWA does not have sufficient water to meet the current demands within their service areas. This Proposed Action is intended to temporarily help alleviate water supply shortages within SDCWA which have been exacerbated by the drought.

SDCWA faced deficits in their water supplies in 2009, and similar conditions are envisioned for 2010. This transfer would reduce some of the potential water shortages related to the drought emergency this year.

Reclamation's execution of the WA contract is to allow SDCWA to temporarily store up to 20,000 AF of non-CVP water from PCWA if needed in Folsom Reservoir, a Federal facility.

Reasonable water conservation measures proposed by SDCWA cannot fully offset drought conditions and reduced allocation from MWD.

On June 4, 2008, in recognition of the water shortages caused by general drought conditions and reduced State Water Project (SWP) and CVP deliveries to the agricultural and urban communities, California's Governor Schwarzenegger issued an Executive Order proclaiming a statewide drought. The Executive Order (EO) ordered the DWR to address the serious drought conditions and water delivery limitations that currently exist in California. The EO also directed DWR to facilitate water transfers, to respond timely to potential emergency water shortages and water quality degradation, and to prepare to operate a dry-year water purchasing program in 2009.

On February 27, 2009, due to continued hydrologic uncertainties and regulatory constraints, Governor Schwarzenegger proclaimed a State of Emergency and ordered immediate action to manage the crisis. In response to the potential impacts of the drought conditions, the SDCWA Board of Directors authorized its staff to acquire temporary dry-year transfer supplies to help offset the impacts of the prolonged drought and the curtailment of its water supplies.

At its April 14, 2009, board meeting, MWD declared a change from its Water Supply Allocation Plan's "Condition 2 - Water Supply Alert" to "Condition 3 - Implement Water Supply Allocation," effective July 1, 2009, at a Regional Shortage Level 2. SDCWA will face an estimated 13 percent cutback of its supplies from MWD in Fiscal Year 2010. In order to reduce its risks, SDCWA must pursue dry-year transfer supplies to offset and manage the cutbacks.

San Diego is facing one of the most challenging periods in its history. Water supply challenges and the current economic downturn will necessitate significant rate increases over the next few years. Despite recent rains and slightly improved hydrologic conditions, California remains in its third consecutive dry-year. Current fish protections have significantly reduced expected yield from the State Water Project under all hydrologic conditions, and additional restrictions may be imposed later this year. Statewide and regional storage levels remain low, and these current and expected regulatory restrictions -- coupled with continued dry weather patterns -- provide limited opportunities to increase storage reserves throughout Southern California, leaving it extremely vulnerable to multiple dry years.

# Chapter 3
# Description of Proposed Action and Alternatives

This chapter describes the alternatives analyzed in; the No-Action Alternative, and the Proposed Action.

For the purposes of impact analyses, environmental documents compare the effects of a No-Action Alternative with those of the Proposed Action. The No-Action Alternative examines a reasonably foreseeable future without project conditions, that is, the future if the Proposed Action is not implemented.

## 3.1 No-Action Alternative

Under the No-Action Alternative, Reclamation would not enter into a temporary WA contract with SDCWA or refill agreement with PCWA. Therefore, SDCWA would not receive the option of storage of up to 20,000 AF of PCWA transfer water in CVP facilities. As a result, there may be no change to facility releases that flow into the Middle Fork and North Fork American River, Lower American River, Sacramento River, and the Delta; there would be less water delivered to customers in SDCWA's service area; and water levels would remain higher in PCWA's MFP reservoirs.

SDCWA may seek other sources for water supply under the No-Action Alternative.

## 3.2 Proposed Action

Reclamation proposes to enter into a reservoir Refill Agreement (RA) and a one-year temporary WA to facilitate the movement of up to 20,000 AF of PCWA water rights water (i.e., PCWA transfer water) from their facilities on the Middle Fork of the American River to be used in the SDCWA service area.

The proposed RA would be between PCWA and Reclamation. The RA would ensure that the proposed transfer does not result in impacts to CVP water supplies or to other legal users of water. The RA accomplishes this goal by limiting the conditions under which PCWA can refill the combined storage space in its two MFP reservoirs, French Meadows and Hell Hole, created by the proposed transfer.

The project area includes the areas in Placer and Sacramento Counties, the Delta, San Joaquin Valley, and further on to southern California (see attached map of project area). The project area also encompasses the service areas of PCWA and SDCWA. Chapter 4 describes the relevant natural features and facilities in these general areas in more detail.

The RA would allow PCWA to refill the 20,000 AF void created in MFP reservoir storage capacity by the transfer only when Folsom Reservoir is deemed "full". "Full" is defined as an

encroachment into the required flood control reservation space during the spring filling period. Once Folsom fills, PCWA's refill obligation is terminated. Until Folsom fills, the MFP's end of year carryover storage may not be increased above the level reached in the year of the transfer. Similar refill agreements have been used by Reclamation in the past in relation to similar temporary transfers. The Refill Agreement also provides that Reclamation and PCWA will cooperatively monitor and report on MFP operations to ensure compliance with its terms.

The proposed WA Contract would be between SDCWA and Reclamation. Pursuant to the WA Contract and in order to facilitate the proposed water transfer, PCWA transfer water could be temporarily stored by Reclamation in Folsom Reservoir until the water can be operationally released by Reclamation into the lower American River (LAR). The Federal facilities involved in the proposed temporary storage of PCWA transfer water are Folsom Reservoir and its appurtenant inlet and outlet facilities. These operations are described in more detail below, under Folsom Reservoir Operations. In coordination with DWR, Reclamation would release the transfer water from Folsom Reservoir into the LAR. The water would then flow into the Sacramento River, and through the Delta to the Banks Pumping Plant. Some of the transfer water would be lost to SDCWA due to carriage water assessments imposed by Reclamation and DWR. Releases of transfer water from Folsom Reservoir would occur from July through September, during periods when the SWP's Banks Pumping Plant has available pumping capacity and other operational constraints allow. Outside of this window of time there may be restrictions on pumping in the Delta due to endangered species concerns. Reclamation's estimated Folsom Reservoir release schedule under the No Action and the Proposed Action are provided in the table below.

Without the WA Contract, the proposed water transfer between PCWA and SDCWA could still occur. However, the federal action of approving and entering into the Refill Agreement without a WA Contract could lead to delays in approval through the State Water Resources Control Board (SWRCB). Additionally, with the WA contract in place there would be more operational flexibility in scheduling the storage and release of transfer water from PCWA's MFP. Accordingly, the proposed transfer is also described and analyzed below. In order to refill MFP reservoirs, without injury to downstream vested water rights holders following the transfer, PWCA will comply with a refill agreement with Reclamation, similar to refill agreements that PWCA and Reclamation have entered into for other PWCA transfers.

The Proposed Action would not involve the construction or modification of any facilities. Only existing facilities would be utilized to convey water to SDCWA service area. Land uses within the PCWA and SDCWA service areas would not change as a result of the transfer.

### 3.2.1 Water Transfer

Source of non-Project water: The source of the non-Project water is PCWA's MFP, which includes diversions from Middle Fork American River, Duncan Creek, Rubicon River, South Fork Long Canyon Creek and North Fork Long Canyon Creek. Placer County Water Agency diverts water to storage in its Hell Hole and French Meadows reservoirs, and stored

water will be released from storage for transfer. If not transferred, the water will remain in the reservoirs.

Project proposal: Under the proposed water transfer PCWA will transfer up to 20,000 AF of rights water currently stored in its MFP to the SDCWA. On May 6, 2009, PCWA filed a petition for this proposed temporary water transfer at the SWRCB. Pursuant to California Water Code section 1725 et seq., the petition requests temporary changes in the point of rediversion and place of use of up to 20,000 AF of water acquired pursuant to PCWA's existing water rights Permits No. 18085 and 18087. The point of rediversion is proposed to be the SWP's Harvey O. Banks (Banks) Pumping Plant, located in the southern portion of the Delta. The place of use is proposed to be the SDCWA's service area (see attached map). No change in the purpose of use is sought. The SWRCB will review this temporary transfer petition and condition any approval to ensure that no unreasonable impacts of the water occur as a result of the water transfer.

Project purpose: Due to water shortages related to drought conditions, SCWA does not have sufficient water supplies to meet service area demands. The SDCWA is a member agency of the MWD. MWD is a SWP Contractor. Water made available through this water transfer program will be used entirely within the SWP service area. The end users will be customers who reside within the service area of the SDCWA. The water would only replace a shortage and would not represent an increase in water supply normally delivered by the Department of Water Resources through MWD's State Water Project contract.

The tentative schedule of Lower American River releases (below Nimbus Dam) during the time frame of the transfer are as follows:

**Table 1-1. Tentative Schedule of LAR Releases**

| | July | August | September |
|---|---|---|---|
| | cfs/TAF | cfs/TAF | cfs/TAF |
| Releases without Project | 4383/269 | 3085/190 | 1260/75 |
| Releases with Project | 4483-4883[1]/276[2] | 3185-3585/197 | 1360-1760/82 |

[1] Flows for all three months are based on a range of 100-800 cfs (i.e., low number is based on 100 cfs/high number on 800 cfs). However, due to the transfer limit of 20 TAF flows can not reach 800 cfs for the entire three-month period.

[2] The 20 TAF transfer amount is assumed to be distributed evenly over the three months (6.67 TAF). The actual monthly amounts may be higher or lower, provided the total amount does not exceed 20 TAF. The carriage loss amount is estimated at 30% and will be accounted for at Folsom Reservoir, in the Delta, and at the end delivery to SDCWA boundaries.

The exact quantities of PCWA water released from MFP facilities for introduction into Folsom Reservoir will be reported by PCWA to SDCWA after the month of scheduled release. SDCWA will in turn report the quantities of water introduced and stored in Folsom Reservoir to Reclamation and DWR. Storage quantities will be determined by comparison between the quantities of water introduced into Folsom Reservoir and the quantities of water released from Project Facilities for the purposes of the proposed transfer project by Reclamation. The quantities of MFP water releases will be measured as specified in the contract. The transfer quantities will be the difference between releases from the MFP which PCWA will report to SDCWA, and the releases from Project Facilities which Reclamation will report to SDCWA. SDCWA will compute the monthly storage, if any, and present monthly reports to Reclamation that will verify the total quantities delivered. In general, the total quantities released from Oxbow Powerhouse will also correlate with the total draw-down of MFP storage to the actual MFP December storage low point. Total quantities delivered to SDCWA boundaries will reflect the stipulated and estimated conveyance losses expressed in the WA Contract.

As a requirement of this transfer, PCWA would enter into an RA with Reclamation under which PCWA will be required to re-release the transfer water in future years if refilling the additional storage space in MFP reservoirs created by this transfer would result in an equivalent decrease in the amount of water stored in Folsom Reservoir.

Middle Fork Project

The MFP serves as a multi-purpose water supply and hydro-generation project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and several associated tributary streams (see project area map). The MFP is located within the Middle Fork of the American River watershed at elevations ranging from approximately 1,100 feet to 5,300 feet. The MFP seasonally stores and releases water to meet consumptive demands within western Placer County and to generate power.

MFP operations for water supply and electric power generation are constrained by regulatory and contract requirements, the physical capacities of the MFP facilities, and water availability. Regulatory and contract requirements include conditions imposed by the MFP's Federal Energy Regulatory Commission ("FERC") license, water rights permits, water delivery contracts, and the existing power purchase contracts with PG&E. Typical annual operation of the MFP results in the capture of runoff which is diverted to increase storage in French Meadows and Hell Hole reservoirs in the winter and spring (filling period), and drawdown of the reservoirs during the summer, fall, and early winter (release period). Operation of the MFP varies from year-to-year based on the timing and magnitude of spring runoff, which is influenced by the amount of winter snow pack and ambient temperature conditions, as well as by precipitation.

The backbone of the MFP is its two principal water storage reservoirs, French Meadows and Hell Hole. These reservoirs are located on the Middle Fork American River and the Rubicon River, respectively, and have a combined gross storage capacity of 342,583 AF. The other primary components of the MFP consist of a series of inter-connected tunnels and powerhouses. The last facility in the MFP is Oxbow Powerhouse, through which water is

released from Ralston Afterbay into the Middle Fork American River about 32 miles upstream of Folsom Reservoir. With the exception of required stream maintenance flows and periodic reservoir spills, all water released from the MFP flows through the hydroelectric generation facilities.

Middle Fork Project Operations

Under PCWA's power sale agreement with PG&E, PG&E has the right to control the operation of the MFP to meet its power supply needs, subject only to regulatory requirements and the release of water necessary to meet PCWA water supply needs. PG&E's planned without-transfer operation schedule shows that the planned releases over the period May through December 2009 totals about 250,000 AF. PCWA's water supply needs from the MFP in 2009 are only expected to be about 36,000 AF, which are obtained through normal PG&E power operations.

The maximum hydraulic capacity of the MFP for the period May through December is about 480,000 AF. To release the planned 250,000 AF will require the MFP to operate about 52 percent of the time. The Oxbow Powerhouse is normally block-loaded to its full capacity of about 1,000 cubic-feet per second (cfs) for several hours per day, and the remainder of the day it operates at a minimum flow of about 200 cfs. Upstream generators are also usually block-loaded, but may be operated at less than full capacity from time to time to meet PG&E's needs. Ralston Afterbay storage can fluctuate too in response to differing hourly inflows and releases.

To release an additional 20,000 AF the MFP will need to add an additional 240 hours of generation over the months of July, August and September. These additional hours of generation will not change the amplitude of peak flows in the Middle Fork American River below Oxbow powerhouse. The additional releases will slightly extend the period of time at which the flow in the Middle Fork American River is closer to 1,000 cfs instead of the minimum flow of 200 cfs.

After being released from the MFP, transfer water would flow into the natural channel of the Middle Fork of the American River and subsequently flow downstream into the North Fork American River and Folsom Reservoir. PCWA's release of transfer water would occur between July and September of 2009 and would increase the expected inflow of water from the North Fork American River into Folsom Reservoir by an amount up to 20,000 AF in accordance with the estimated inflow schedule shown in the table below:

**Table 2. Estimated With and Without Transfer MFP Releases, Estimated 2009 Folsom Reservoir Inflow from The Middle Fork American River, and Lower American River Releases Without Transfer**

| | July | August | September |
|---|---|---|---|
| Folsom Inflow **With** Transfer (AF) | 48,770 | 50,000 | 40,990 |
| Folsom Inflow **Without** Transfer (AF) | 41,430 | 42,650 | 35,660 |
| Monthly Average LAR Releases **Without** [3]Transfer (cfs) | 4,383 | 3,085 | 1,260 |
| LAR Releases **Without** Transfer (AF) | 269,000 | 190,000 | 75,000 |
| Additional Water Released into LAR (AF) (**with** transfer) | 7,340 | 7,350 | 5,330 |

At the end of the year, MFP combined carryover storage would be 20,000 AF less than the without-transfer condition. The 20,000 AF of new water, released from MFP storage, which would have otherwise remained in storage in the absence of this transfer, is the water that is proposed to be transferred. As explained above, the Refill Agreement will dictate when PCWA can refill the 20,000 AF storage "void" created by the proposed water transfer.

Folsom Reservoir Operations

It is important to note that the above table presents only estimated average values, not actual real-time operations which are governed by numerous requirements and may vary to some extent from scheduled operations and releases. Reclamation's release of the transfer water from Folsom Reservoir into the lower American River (LAR) would increase Folsom Reservoir releases during particular days or times within this period in the range of between 100 – 800 cfs, until all the transfer water is released. As previously stated, due to the real-time nature and constant changes in conditions, the precise operations of Folsom Reservoir and the particular schedule of release of transfer water from Folsom Reservoir cannot be predicted or described in exact detail. If Folsom Reservoir operations require storage of the transferred water rather than pass-through release within 30 days of introduction, then some

[3] Flows for all three months may vary 100-800 cfs with the transfer. However, due to the transfer amount of 20 TAF, flows can not reach 800 cfs for the entire 3 month period.

or all of the introduced water may be temporarily stored in Folsom Reservoir for later release.

Reclamation would approve an SDCWA schedule for release for the transfer water from Folsom Reservoir as either an incremental increase over the without-transfer operation or by attenuating the rate of flow reductions from Folsom Reservoir when the without-transfer flow would have been reduced. For instance, if the without-project average daily releases in July are approximately 4,000 cfs and those in August are approximately 3,000 cfs, this does not mean that flows would abruptly decrease by this increment from July 31 to August 1. Instead, whenever Reclamation changes releases from Folsom, an attempt is made to attenuate these changes as much as possible, given the circumstances, by gradually ramping down flows in increments of 100 - 200 cfs over a period of hours or days to minimize the potential effects of sudden flow fluctuations. Reclamation's additional release of transfer water for the proposed transfer would extend and attenuate this period of ramping down or extend the period of higher releases as the July-September operation pattern progresses. The transfer releases from Folsom Reservoir will be made in addition to the releases made to meet CVP purposes for water supply, instream flow objectives, and Delta water quality and flow objectives. This also includes releases made for CVP exports at Banks pumping plant (Joint Point of Diversion).

Reclamation coordinates Folsom Reservoir releases based on information from meetings with DWR, as well as from state and federal fishery management agencies, the American River Operations Groups, and other local agencies to ensure that any change in flows is accomplished using the best available data to avoid any significant adverse environmental effects or effects to other legal users of water.

If actual release of water results in American River flow changes of any importance, Reclamation will coordinate with the Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) to implement the Interagency Fishery Rescue Strategy prepared by DFG, NMFS, and FWS (see Appendices).

In addition, the proposed transfer will have no measureable impact on the project's ability to operate according to the 2009 temperature operation plan, due to favorable lake storage and cold-water pool conditions this spring.

SWP Operations

After release from Folsom Reservoir, the transfer water would be pumped by DWR at its Banks Pumping Plant. From Banks Pumping Plant, DWR would convey transfer water directly to the MWD using SWP facilities. MWD holds a contract with the State for delivery of up to approximately 2 million AF of SWP water, and is a wholesaler of water supplies to SDCWA. After delivery from DWR, MWD would convey the transfer water to SDCWA using its water conveyance facilities.

As stated above, MWD will assist SDCWA in wheeling the transfer water to the SDCWA service area, subject to available capacity, consistent with Articles 55 and 56 of MWD's SWP Long Term Water Supply Contract. MWD's policy with regard to the wheeling of

water not owned or controlled by Metropolitan is set forth in its Administrative Code, Sections 4119 and 4405. These Code provisions implement MWD board policy, which is to support its member agencies' purchase and transportation of water not owned or controlled by MWD, provided that all of the conditions of the Administrative Code are satisfied, which include full cost recovery. The wheeling service policy states that member agencies have the right to utilize MWD's rights to SWP facilities.

Implementation of the Proposed Action would continue to meet Reclamation's and DWR's regulatory obligations including Delta standards and instream flow requirements on the Sacramento River. These obligations include the most recent Biological Opinion (BO) for winter-run Chinook salmon, spring-run Chinook salmon, the Southern population of North American green sturgeon, and Central Valley steelhead; the most recent BO for delta smelt; water rights permit terms and conditions; SWRCB decisions; and other operational constraints.

## Alternatives Considered but Rejected:

Alternatives determined to be unreasonable are eliminated from further consideration.

Drought Water Bank (DWB): The SDCWA addressed the emerging drought conditions by responding and requesting participation in DWR's newly formed 2009 Drought Water Bank Program (Bank Program). However, DWR sent SDCWA a letter indicating only SWP and CVP Contractors would be allowed to participate in the Bank Program. Therefore, the alternative to purchase water through the DWR's Bank Program was not a feasible option.

Feather River Water Project Agency (SFWPA): On November 26, 2008, SDCWA entered into a temporary one-year water transfer with South Feather Water and Power Agency (SFWPA) for the purchase and transfer of 10,000 af. DWR and SFWPA were unable to develop new refill criteria which would satisfy both parties in order to effectuate this transfer. Therefore, this project was not able to transfer water to the Water Authority and was deemed not feasible.

Other Transfer: SDCWA has met with other potential sellers including, Conaway Ranch, Natomas Central Mutual Water Company, Delta Wetlands, River Garden Farms, South Sutter Water District, South Sutter Extension, and Butte Water District, whom were considering fallowing and/or groundwater substitution programs. However, due to the costs, technical feasibility and timing of these programs, they were not pursued for SDCWA's 2009 dry-year transfer supplies.

**Reasonably Foreseeable Actions Within the American River Basin, Drought Water Bank (DWB) transfers, include:**

1. Sacramento Suburban Water District (SSWD), 12,000 AF of their Placer County Water Agency (PCWA) water going to the Drought Water Bank (DWB). SSWD proposes to forgo diversion of 12,000 AF of surface water it anticipates would be available during May – October for diversion from Folsom Reservoir pursuant to its contract with PCWA. SSWD would then pump groundwater in an amount equivalent to that which it would otherwise

receive pursuant to the contract. Under the contract, PCWA makes Middle Fork American River Project water available to SSWD in Folsom Reservoir consistent with the State Water Resources Control Board's "Change of Place of Use" decision allowing PCWA water to be used in Sacramento County. Production data indicates that SSWD has the capability of supplying the North Service Area with more than 18,000 AF of groundwater from May through October. Therefore, SSWD can physically pump groundwater to meet its projected May through October North Service Area demand of 13,950 AF.

2. SSWD; 5,000 AF of their City of Sacramento water rights water going to the DWB. SSWD proposes to forgo diversion of surface water and instead pump groundwater. SSWD has a contract for surface water with the City of Sacramento that would otherwise entitle it to divert 5,000 AF during the months of June through September. Receipt of 5,000 AF surface water would be available during June-September 2009 pursuant to the *Wholesale Water Supply Agreement Between the City of Sacramento and Sacramento Suburban Water District* (Wholesale Agreement), and would pump groundwater in an amount equivalent to that which it would otherwise receive through the Wholesale Agreement. By forgoing diversion, SSWD would make water available to the Bureau of Reclamation in Folsom Reservoir for delivery to the DWB.

3. City of Sacramento; 1,000 AF of their own American River water rights water going to the DWB. The City proposes to provide up to 1,000 AF to the DWB this year. The City will accomplish by extracting additional groundwater in excess of 1,000 AF (to account for losses) to meet City water supply demands and making a like amount of surface water available to the DWB. The City proposes to forgo an increment of surface water diversions by pumping additional groundwater. The City's proposal is to sell the forgone surface water to the DWB.

# Chapter 4
# Affected Environment and Environmental Consequences

As much as possible, PCWA Middle Fork Project water entering Folsom Reservoir would be released as a pass through operation. However, with the execution of a WA contract with SDCWA, Reclamation could store water in Folsom Reservoir then release it into the lower American River, which then flows into the Sacramento River, and through the Delta.

The 20,000 AF proposed for transfer to SDCWA is currently in MFP storage and would not be released in the absence of this transfer this year. The proposed water transfer is intended to replace water supplies that have been depleted from the SDCWA service area due to drought conditions and regulatory constraints. Metropolitan Water District (a SWP contractor) recently cut SDCWA supplies by approximately 13 percent as a result of drought restrictions. The proposed water transfer of up to 20,000 AF would restore SDCWA's water supply and enable them to meet the mandatory restrictions and lessen the reduction in supply passed on to its member agencies (by approximately 8 percent). This water is not new water and will only be replacing the supplies that were lost.

This chapter presents the affected environment and environmental consequences of the proposed temporary WA. Two alternatives are analyzed in this chapter; the No Action Alternative and the Proposed Action. Impacts are analyzed in each resource section (Section 4.2 through 4.5) and summarized in Section 4.7.

## 4.1 Environmental Consequences Analysis

Resource areas analyzed in detail are Water Resources, Biological Resources, and Socioeconomics. These resource areas have the potential to be affected by the proposed action and are discussed in Sections 4.2 through 4.4 of this chapter. Resources not analyzed in detail and the reasons for not analyzing them in detail are below.

During preparation of the EA it became evident that the Proposed Action would have no effect on several resources within the Action Area, because the Proposed Action: (1) does not include any construction-related activities; and (2) would not directly result in land conversions. Therefore, no affected environment description has been provided in this chapter and no impact analysis has been conducted related to potential effects on air quality, noise, geology and soils, visual resources, transportation.

**Resources Not Analyzed in Detail**
Based on review of the SDCWA WA Proposed Action, the following resources were determined to have no impacts as a result of the Proposed Action and are not analyzed in this EA. These resources are:

**Agricultural Resources -** Agricultural lands would not be impacted within the project area. The water transfer is for M&I purposes; therefore no agricultural resources would be affected by the proposed action or the no action alternative.

**Surface Water Quality -** Water quality would not be degraded as a result of the proposed alternative or the no action alternative. Temporary short-term flows and storage changes in the action area's rivers and reservoirs may actually provide slightly better water quality by increasing the dilution of contaminants or would provide no change at all.

**Land Use, Planning, and Zoning –** The Proposed Action would not require any changes to land use, planning, or zoning.

**Population and Housing -** The proposed alternative would not result in impacts that would cause changes to population or housing.

**Hydropower –** There will be no significant impact to power generation available to the California grid. The transfer will not result in a net loss of hydropower generation. There would be an increase in generation of about 66,000 MWh in the year of the transfer with a corresponding decrease in generation in future years. The long term average annual generation from the MFP is about 1,030,000 MWh. The increase/decrease is about 6.6% of average annual MFP generation.

**Public Health and Safety -** The proposed alternative and the no action alternative would not result in negative impacts to public health and safety, but may provide more reliable drinking water supplies to the SDCWA service area.

**Indian Trust Assets (ITAs) -** No ITAs exist within or near the project site and no impacts to ITAs would occur.

**Environmental Justice -** Minority or low income populations would not be affected within the project area; therefore no environmental justice impacts would occur.

**Irreversible and Irretrievable Commitment of Resources, Climate Change, Relationship Between Short-Term Uses and Long-Term Productivity**

**(Sustainability), and Cumulative Impacts –** The proposed action, which is simply a release of 20,000 af from Folsom Reservoir, is short term and temporary; therefore, no effects are anticipated in these categories as a result of the proposed action relative to the no action alternative.

**Terrestrial Species** – The proposed action is a water transfer and is not expected to have any measurable impact on terrestrial species. Terrestrial species are briefly addressed in section 4.3.1.

## 4.2 Water Resources

This section describes aspects of the affected environment relating to the water supply and management of surface water that may be affected if the action alternative is implemented. This section presents the affected environment and environmental consequences for water supply, hydrology, and flows.

### 4.2.1 Regulatory Setting

This section describes applicable laws and regulations for implementation of the Proposed Action.

**Clean Water Act:**

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the U.S. and authorizes the U.S. Environmental Protection Agency (USEPA) to implement pollution control programs. In California, the USEPA has delegated authority to the State Water Resources Control Board (SWRCB) and nine Regional Water Quality Control Boards (RWQCBs).

**Porter-Cologne Water Quality Control Act and Basin Plans:**

The Porter-Cologne Water Quality Control Act of 1970 established the SWRCB and nine RWQCBs within the State of California. These agencies are the primary state agencies responsible for protecting California water quality to meet present and future beneficial uses and regulating appropriative surface rights allocations.

Section 303 of the CWA requires states to adopt water quality standards which "*consist of the designated uses of the navigable waters involved and the water quality criteria for such waters based upon such uses.*" According to Section 13050 of the California Water Code, Basin Plans consist of a designation or establishment of beneficial uses to be protected for the waters within a specified area and water quality objectives to protect those uses. The preparation and adoption of water quality control plans, or Basin Plans, and statewide plans, is the responsibility of the SWRCB.

The CVRWQCB Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (CVRWQCB Basin Plan) regulates waters of the state for the surrounding waterbodies in the project area, including Folsom Reservoir and the Lower American River. The CVRWQCB Basin Plan establishes water quality requirements based on the beneficial uses designated for each waterbody.

**Central Valley Project Improvement Act**

The Reclamation Projects Authorization and Adjustment Act of 1992 (Public Law (PL) 102-575), includes Title 34, the CVPIA. Among the changes mandated by the CVPIA was dedication of 800,000 AF annually to fish, wildlife, and habitat restoration. The Department of Interior's May 9, 2003 decision on Implementation of Section 3406 (b)(2) of the CVPIA provides the basis for implementing upstream and Delta actions for fish management purposes. Implementation of Section 3406 (b)(2) includes Jones Pumping Plant export

curtailment for fishery management protection and augmenting instream flows, based on USFWS recommendations.

**CVP and SWP Operations**

The National Marine Fisheries Service's (NMFS) and the U.S. Fish and Wildlife Service (FWS) both submitted final biological opinions (BOs) on the operations of the CVP and SWP. NMFS BO was submitted to the Bureau of Reclamation on June 4, 2009, and the FWS BO was submitted on December 15, 2008. These opinions describe the CVP/SWP operations, and its effects on listed species, and designated and proposed critical habitats, in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.c. 1531 et seq.).

Based on the best available scientific and commercial information, NMFS final Opinion concludes that the CVP/SWP operations are likely to jeopardize the continued existence of Federally listed and destroy or adversely modify their designated critical habitat:

- Endangered Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*),
- Threatened Central Valley spring-run Chinook salmon (*0. tshawytscha*),
- Threatened Central Valley steelhead (*0. mykiss*),
- Threatened Southern Distinct Population Segment (DPS) of North American green sturgeon (*Acipenser medirostris*), and
- Southern Resident killer whales (*Orcinus orca*).

The FWS BO concludes that the CVP/SWP operations are likely to jeopardize the continued existence of Federally listed and destroy or adversely modify their designated critical habitat:

- Threatened delta smelt (*Hypomesus transpacificus*).

Both BOs contained a Reasonable and Prudent Alternative (RPA) that the issuing agency believes would avoid the likelihood of jeopardizing the continued existence of listed species or destruction or adverse modification of designated critical habitat. The Bureau of Reclamation provisionally accepted both RPAs and have modified CVP and SWP operations to comply with the requirements of the RPAs.

**Coordinated Operations Agreement**

The Coordinated Operations Agreement (COA) defines how Reclamation and DWR share their joint responsibility to meet Delta water quality standards and the water demands of senior water right holders, and how the two agencies share surplus flows (Reclamation and DWR 1986). The COA defines the Delta as being in either "balanced water conditions" or "excess water conditions." Balanced water conditions are periods when Delta inflows are just sufficient to meet water user demands within the Delta, outflow requirements for water quality and flow standards, and export demands. Under excess water conditions, Delta outflow exceeds the flow required to meet the water quality and flow standards. Typically, the Delta is in balanced water conditions from June to November, and in excess water conditions from December through May. However, depending on the volume and timing of winter runoff, excess or balanced water conditions may extend throughout the year.

**Water Right Decision 1641 and Water Quality Control Plan for San Francisco Bay/Sacramento-San Joaquin Delta Estuary**

SWRCB Water Right Decision 1641 (D-1641) contains the current water right requirements to implement the 1995 Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (WQCP). D-1641 incorporates water right settlement agreements between Reclamation and DWR and certain water users in the Delta and upstream watersheds regarding contributions of flows to meet water quality objectives. The SWRCB imposed terms and conditions on the water rights held by Reclamation and DWR that require them, in some circumstances, to meet many of the water quality objectives established in the 1995 WQCP. D-1641 also authorizes the CVP and SWP to use joint points of diversion (JPOD) in the south Delta, and recognizes the CALFED Operations Coordination Group process for operational flexibility in applying or relaxing certain protective standards.

The 1995 Water Quality Control Plan (WQCP) established water quality control objectives for the protection of beneficial uses in the Delta. The 1995 WQCP identified (1) beneficial uses of the Delta to be protected, (2) water quality objectives for the reasonable protection of beneficial uses, and (3) a program of implementation for achieving the water quality objectives. The SWRCB adopted a new Bay/Delta WQCP on December 13, 2006. However, the 2006 WQCP made only minor changes to the 1995 WQCP.

**Joint Point of Diversion**

The JPOD refers to the CVP and SWP use of each other's pumping facilities in the south Delta to export water from the Delta. In 1978, by agreement with DWR and with authorization from SWRCB, the CVP began using the SWP Banks Pumping Plant for replacement pumping (195,000 AF per year) for pumping capacity lost at Jones Pumping Plant because of striped bass pumping restrictions in Decision 1485. In 1986, Reclamation and DWR formally agreed that "either party may make use of its facilities available to the other party for pumping and conveyance of water by written agreement" and that the SWP would pump CVP water to make up for striped bass protection measures (Reclamation and DWR 1986).

**National Wild and Scenic Rivers Act**

The National Wild and Scenic Rivers System was established in 1968 with the enactment of PL 90-542 (16 USC 1271 et seq.). Under this system, rivers possessing "outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values" may be designated as wild, scenic, or recreational.

**1992 Delta Protection Act**

The State's 1992 Delta Protection Act designates the Delta Primary Zone[1] as an area to be protected from intrusion of nonagricultural uses (Section 29703a), and establishes the DPC.

[1] "Primary Zone" is defined as "…the delta land and water area of primary state concern and statewide significance which is situated within the boundaries of the delta, as described in Section 12220 of the Water Code, but that is not within either the urban limit line or sphere of influence line of any local government's general plan or currently existing studies, as of January 1, 1992. The precise boundary lines of the primary zone includes the land and water areas as shown on the map titled "Delta Protection Zones" on file with the State Lands Commission. Where the boundary between the primary zone and secondary zone is a river, stream, channel, or waterway, the boundary line shall be the middle of that river, stream, channel, or waterway."(1992 Delta Protection Act Section 29728).

In 1995, the DPC adopted its Regional Plan, Land Use and Resource Management Plan for the Primary Zone of the Delta. With respect to recreation, the Delta Protection Act includes the following provisions:

- The state's basic goals for the Delta include the protection, maintenance and, where possible, the enhancement and restoration of the overall quality of the Delta environment including, but not limited to, agriculture, wildlife habitat and recreational activities (Section 29702).
- Wildlife and wildlife habitats in the Delta are valuable, unique and irreplaceable resources of critical statewide significance, and it is the policy of the state that they should be preserved and protected for the enjoyment of current and future generations (Section 29705).
- Agricultural, recreational, and other uses of the Delta can best be protected by implementing projects that protect wildlife habitat before conflicts arise (Section 29710).
- The waterways and marinas in the Delta offer recreational opportunities of statewide and local significance, and are a source of economic benefit to the region, and because of increased demand and use, public safety requirements will increase (Section 29702).

### 4.2.2 Affected Environment

**Middle Fork and North Fork American Rivers**

Water quality in the American River is considered to be good, although historical water quality data for the North and Middle Forks American rivers are sparse (Corps 1991). Information on sediment in the river is not readily available; however, turbidity results indicate that the river carries relatively little sediment during low flows. Several wastewater sources discharge into the North and Middle Fork American rivers or to their tributaries. Sources of wastewater discharge include two sawmills located at Foresthill; one is on a tributary to Devil's Canyon and the North Fork American River, and the other discharges directly into the Middle Fork American River. Levels of pH have exceeded objectives in the Middle Fork American River. This exceedance is attributable to photosynthetic activity (Placer County 1994a).

The American River is a major tributary to the lower Sacramento River. The headwaters for the Middle Fork American River watershed (i.e., the Rubicon River) are at Rockbound Valley in the Desolation Wilderness (elevation 9,974 feet). The Middle Fork American River watershed extends westward to the confluence with the North Fork American River, east of Auburn (elevation 650 feet). The average annual yield for the Middle Fork American River for the period of 1959 through 1991 was 805,000 AF. The Rubicon River is the main tributary to the Middle Fork American River, and receives its water from the South Fork Rubicon River and Pilot Creek. Other tributaries to the Middle Fork American River are Duncan Canyon Creek, and Long Canyon Creek. The main reservoirs in the Middle Fork watershed are French Meadows, Hell Hole, Rubicon, Loon Lake, Gerle Creek, and Stumpy Meadows Lake. PCWA and PG&E operate most of the reservoirs in the Middle Fork watershed.

PCWA developed and PG&E currently operates the MFP, a multi-purpose project designed to conserve and control waters of the Middle Fork American River, the Rubicon River, and certain tributaries for irrigation, domestic, and commercial purposes, and for the generation of electricity. French Meadows and Hell Hole reservoirs are the primary storage facilities, but the MFP also includes five diversion dams, five power plants, diversion and water transmission facilities, five tunnels, and related facilities. Water that is not diverted to storage travels through a system of tunnels and power plants before being released into the Middle Fork American River.

Water from French Meadows and Hell Hole reservoirs is released downstream to Ralston Afterbay on the Middle Fork American River. Ralston Afterbay, located approximately 20 miles east of Auburn, is operated as a re-regulating reservoir for the MFP. Ralston Afterbay releases reflect upstream regulation to maximize hydropower generation while meeting an instream flow requirement of 75 cfs on the Middle Fork American River. The Middle Fork then joins the North Fork American River before flowing into Folsom Reservoir. PCWA has water rights allowing for power generation and recreational uses, as well as for irrigation and incidental domestic and municipal and industrial (M&I) uses. PCWA's water rights authorize 120,000 AF of consumptive uses of the combined waters of the North and Middle Fork American rivers.

The headwaters to the North Fork American River watershed are in the Sierra Nevada at an elevation of approximately 9,000 feet. The watershed extends westerly to Folsom Reservoir, south of Auburn, at the 650-foot elevation. The North Fork flows are altered by the North Fork Dam at Lake Clementine, upstream of its confluence with the Middle Fork American River.

Downstream of its confluence with the Middle Fork American River, the North Fork American River flows are a combination of regulated and unregulated flows. Flows in the North Fork below its confluence with the Middle Fork are directly affected by fluctuations in Ralston Afterbay releases, but are attenuated by the unregulated flows from the North Fork of the Middle Fork American River and the North Fork American River, which exhibit less diurnal fluctuation.

Average annual runoff in the North Fork American River from 1942 through 1992 was 594,000 AF. North Fork American River flows have been estimated based upon upstream gage measurements. The dry season flow at just below the confluence with the Middle Fork averages about 1,100 cfs. However, flows during the summer periodically fluctuate to as low as 100 to 200 cfs because of upstream power production. The estimated peak flow of the 1.5-year flood event is 12,400 cfs. The peak flow of the 100-year flood event is estimated to be 220,000 cfs (Reclamation 1996).

Available average daily flow records for the Middle Fork American River recorded at the Middle Fork American River near Oxbow Powerhouse gaging station) were obtained from the DWR's California Data Exchange Center (CDEC) website (http://cdec.water.ca.gov/). Mean monthly flows on the Middle Fork American River below Oxbow Powerhouse

(Ralston Afterbay) for the March through December period (1997 through 2008[2)] ranged from a low of approximately 259 cfs in October to a high of approximately 1,526 cfs in March (**Table 3-1**). The lowest minimum monthly flow of 147 cfs occurred in November and the highest maximum monthly flow of 3,523 cfs occurred in February. These flows satisfy the minimum instream flow requirements of 75 cfs year-round at this location. The 75 cfs minimum fish flow release specified in Article 37 of the FERC license, was agreed to by California Department of Fish and Game (CDFG) and is, indirectly, a part of the SWRCB permit. As shown by these flow estimates, hydropower generation and subsequent Ralston Afterbay releases can vary greatly over a year.

**Table 3-1.** Minimum, Maximum, and Mean Monthly Flow (cfs) for the Middle Fork American River below Oxbow Powerhouse (Ralston Afterbay) during the January through December Period (1997-2008)

| Monthly Flows | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Minimum | 334 | 437 | 613 | 491 | 467 | 377 | 512 | 451 | 283 | 94 | 147 | 174 |
| Maximum | 1,972 | 3,523 | 2,582 | 4,027 | 3,117 | 2,267 | 1,326 | 1,094 | 820 | 517 | 765 | 1,735 |
| Mean | 1,051 | 1,525 | 1,526 | 1,520 | 1,472 | 1,052 | 762 | 719 | 564 | 259 | 515 | 783 |
| *Source: CDEC 2003* | | | | | | | | | | | | |

**French Meadows and Hell Hole Reservoirs**
Construction of French Meadows and Hell Hole reservoirs was completed in 1966 and 1965, respectively. Maximum storage capacity is 136,000 AF in French Meadows Reservoir and 208,000 AF in Hell Hole Reservoir. French Meadows Reservoir is located in the upper Middle Fork American River watershed, about 16 miles west of Lake Tahoe. Hell Hole Reservoir is located about three miles southeast of French Meadows Reservoir on the Rubicon River. Water is released from these storage reservoirs downstream to Ralston Afterbay on the Middle Fork American River.

**Lower American River**
The lower American River consists of the 23-mile stretch of river from Nimbus Dam to the confluence of the American and Sacramento rivers in the City of Sacramento. Average lower American River annual flows volume downstream of Folsom Dam at Fair Oaks are approximately 2,650,000 AF (Reclamation 2004).

**Folsom Reservoir and Dam**
Folsom Reservoir is the principal reservoir on the American River, with a maximum storage capacity of 977,000 AF. Reclamation operates Folsom Dam and Reservoir for the purposes of flood control, meeting water contract and water right obligations, providing downstream releases for the lower American River, and helping to meet Delta water quality standards.

Flood-producing runoff occurs primarily during October through April and is usually most extreme during November through March. Snowmelt runoff usually does not result in flood-producing flows. The region's agricultural and M&I demands are met by water purveyors in

[2] Data are not available prior to 1997.

areas upstream of, around, and downstream of Folsom Reservoir. The El Dorado Irrigation District, City of Roseville, San Juan Water District, California State Prison, and the City of Folsom are the main entities that divert water from Folsom Reservoir.

**Lake Natoma and Nimbus Dam**

Lake Natoma serves as the Folsom Dam afterbay and was formed as a result of Nimbus Dam. Lake Natoma has a maximum storage capacity of 9,000 AF, and inundates approximately 500 acres. Lake Natoma is operated as a re-regulating reservoir that accommodates the diurnal flow fluctuations caused by the power peaking operations at Folsom Power Plant. Nimbus Dam, along with Folsom Dam, regulates water releases to the lower American River.

The minimum allowable flows in the lower American River are defined by SWRCB Decision 893 (D-893), which states that, in the interest of fish conservation, releases should not ordinarily fall below 250 cfs between January 2 and September 15 or below 500 cfs at other times. D-893 minimum flows are rarely the controlling objective of CVP operations at Nimbus Dam. Nimbus Dam releases are nearly always controlled during significant portions of a water year by either flood control requirements, fishery requirements under Central Valley Project Improvement Act (CVPIA) 3406(b)(2), recent Biological Opinions (NMFS, 2009 BO), or through coordination with other CVP and SWP releases to meet downstream SWRCB Decision 1641 requirements in the Delta and CVP water supply objectives (Reclamation 2004).

Rapid flow fluctuations in the lower American River are primarily in response to either flood control operations at Folsom Dam or operational changes in releases to meet SWRCB water quality standards in the Delta. The close proximity of Folsom Dam and Reservoir to the Delta, and the relatively short period of time for the releases to reach the Delta, result in Folsom Reservoir commonly being relied upon as the first response to meet Delta standards while releases from more distant CVP reservoirs take time to travel downstream. In the past, rapid flow fluctuations were common; however, in recent years Reclamation, through coordination with Fishery Agencies, minimized these fluctuations in both magnitude and frequency. In addition, flow fluctuations above and below 4,000 cfs are monitored as per the Interagency Fish Rescue Strategy that was finalized in April of 2009 by Department of Fish and Game, NMFS and FWS. The most recent NMFS BO (2009) contains ramping criteria for maintaining flows less than 5,000 cfs between January 1 and May 30; flow reductions shall not exceed more than 500 cfs/day and not more than 100 cfs per hour.

**Sacramento River**

The Sacramento River originates near the slopes of Mount Shasta and flows southward to Suisun Bay. The river drains 26,000 square miles with an average annual natural runoff of about 18,000,000 AF. Sacramento River flows are controlled primarily by Reclamation's Shasta Dam. Flows in the Sacramento River normally peak during December through February. The drainage area upstream of Sacramento is 23,502 square miles. The historical average annual flow volume for the Sacramento River at Freeport is 16,677,000 AF. The Feather and American rivers are the two largest contributors to the Sacramento River. The

lower Sacramento River is defined as that section of the river downstream of its confluence with the lower American River.

Sacramento River flows are largely determined by the operation of upstream reservoirs (e.g., Shasta, Trinity, and Keswick) as well as the timing and rates of diversions from the Sacramento River and tributary streams. Diversions from the Sacramento River and tributary streams also influence seasonal flow levels by reducing overall flow volumes in the river. Shasta Reservoir is the largest CVP reservoir, storing up to 4,500,000 AF of water.

The natural flow pattern of the Sacramento River has been substantially altered due to a variety of river flow control facilities. Flows have been reduced during the wetter months due to upstream storage and diversions, but are typically higher during the drier months due to the requirements to set flows at levels capable of meeting water quality objectives and water delivery obligations. The flow of the Sacramento River can significantly vary from year-to-year and within a year. Flow in the Sacramento River is generally controlled by CVP and SWP operations, although periods of significant uncontrolled runoff continue to occur.

**Central Valley Project (CVP) Facilities and Operations**

The CVP service area extends approximately 500 miles through much of California's Central Valley from Trinity and Shasta reservoirs in the north to Bakersfield in the south). The CVP is composed of some 18 reservoirs with a combined storage capacity of more than 11 million AF, 11 power plants, and more than 500 miles of major canals and aqueducts (Reclamation 2004). In most years, the combination of carryover storage and runoff in the Central Valley and runoff into CVP reservoirs is sufficient to provide the water to meet CVP contractors' demands.

The CVP Delta Division facilities include the Delta Cross Channel, the Contra Costa Canal, the Jones Pumping Plant and associated fish collection facility, and the Delta-Mendota Canal.

The Delta Cross Channel is a gated diversion channel off the Sacramento River near Walnut Grove. When the gates are open, water flows from the Sacramento River through the Delta Cross Channel to the lower Mokelumne and San Joaquin rivers. The Delta Cross Channel is operated to improve water quality in the interior and southern Delta and to improve the transfer of water from the Sacramento River to the CVP and SWP export facilities in the south Delta.

The Jones Pumping Plant, located in the south Delta about five miles from the City of Tracy, is used to lift water from the Delta into the Delta-Mendota Canal. The pumping plant is located at the end of a 2.5-mile intake channel. At the head of the intake channel, louver screens intercept fish, which are collected and transported by tanker to release sites away from the pumps. Jones Pumping Plant consists of six pumps with a collective maximum rated capacity of about 5,100 cfs, although the permitted capacity is 4,600 cfs. When irrigation demands in the upper reaches of the Delta-Mendota Canal are low, pumping can be constrained by the capacity of the lower reaches of the Delta-Mendota Canal (Reaches 11 to 13) to 4,200 cfs.

Water exported at the pumps of the Jones Pumping Plant is conveyed via the Delta-Mendota Canal and via the joint reach of the California Aqueduct (San Luis Canal) to M&I and agricultural contractors in the San Joaquin Valley. Water from the Delta-Mendota Canal also may be pumped into San Luis Reservoir, where the water commingles with SWP water exported at Banks Pumping Plant. CVP water in San Luis Reservoir is subsequently either diverted to M&I and agricultural water users in Santa Clara and San Benito counties or released back into the Delta-Mendota Canal or the San Luis Canal via O'Neill Forebay.

CVP demands typically exceed pumping limitations at Jones Pumping Plant capacity in the spring and summer months. During this period, the CVP depends on releases from San Luis Reservoir to augment pumping at Jones Pumping Plant. In all but the driest years, there is limited or no unused pumping capacity at Jones Pumping Plant. When the water supply is available and exports are not limited by standards, the Jones Pumping Plant is operated continuously near the Delta-Mendota Canal capacity limits. However, Jones Pumping Plant exports are typically reduced during the spring to protect endangered fish and to meet water rights requirements and D-1641 criteria. In years that the capacity of Jones Pumping Plant is fully utilized, the CVP may wheel water through the SWP system using excess capacity at Banks Pumping Plant and the California Aqueduct.

**Cross-Delta Water Transfers**

California's water market developed as a result of the last major drought in California (1987 to 1992) and has been facilitated by changes in Federal and State legislation pertaining to water rights and entitlements. The California legislature passed several laws in the 1980s and 1990s making it easier to transfer water beyond the boundaries of historical water service areas. These laws developed an expedited process for the SWRCB to temporarily change the water rights (i.e., point of diversion and place of use) of those conducting short-term (i.e., one-year) water transfers. Passage of the CVPIA in 1992 changed various policies of the CVP to allow water transfers among CVP contractors in prescribed situations.

Transfers requiring exports from the Delta are done at times when conveyance and pumping capacity at the CVP or SWP export facilities is available to move water. Parties to the transfer are responsible for providing the incremental change in flows required to protect Delta water quality standards and/or fish species.

Reclamation and DWR have operated water acquisition programs to provide water for environmental programs, and additional supplies to CVP contractors, SWP contractors, and other parties. DWR programs include the 1991, 1992, and 1994, and 2009 Drought Water Banks, as well as the 2001, 2002, 2003, and 2004 Dry Year Programs. Almost 800,000 AF were purchased in 1991 as part of DWR's Drought Water Bank, and 1991 remains the largest water transfer year of record. Reclamation operated a forbearance program in 2001 by purchasing CVP contractors' water in the Sacramento Valley for CVPIA instream flows, and to augment water supplies for CVP contractors south of the Delta. Reclamation administers the CVPIA Water Acquisition Program for Refuge Level 4 supplies and fishery instream flows.

The surplus pumping capacity in the Delta available for water transfers varies with hydrologic conditions and with CVP and SWP allocations. In general, under wetter hydrologic conditions, surplus capacity is lower because the CVP more fully utilizes capacity for their own supplies. The CVP has little surplus capacity except in the driest hydrologic conditions.

Under low outflow conditions, increases in Delta exports can cause additional saltwater intrusion if the Delta outflow is not increased. Under these conditions additional releases are typically made from upstream reservoirs to match the increase in export pumping plus additional flows to maintain water quality. The additional increment of inflow (and corresponding increase in Delta outflow) that is needed to offset the additional effect of exports on saltwater intrusion, and prevent degradation of water quality at Delta drinking water intakes, is referred to as "carriage water."

**State Water Project (SWP) Facilities and Operation**

SWP facilities in the Delta include the North Bay Aqueduct, Clifton Court Forebay, John E. Skinner Delta Fish Protection Facility, Harvey O. Banks Delta Pumping Plant, and the intake channel to the pumping plant. The North Bay Aqueduct would not be affected by the action alternatives, and therefore, is not discussed further. Banks Pumping Plant lifts water 244 feet to the beginning of the California Aqueduct. An open intake channel conveys water to Banks Pumping Plant from Clifton Court Forebay. The forebay provides storage for off-peak pumping and permits regulation of flows into the pumping plant. All water arriving at Banks Pumping Plant flows first through the primary intake channel of the John E. Skinner Delta Fish Protective Facility. Fish screens (louvers) across the intake channel direct fish into bypass openings leading into the salvage facilities. The main purpose of the fish facility is to reduce the number of fish adversely impacted by entrainment at the export facility and to reduce the amount of floating debris conveyed to the pumps.

Banks Pumping Plant facilities has a total of elevens pumps with a total capacity of 10,668 cfs; two pumps are rated at 375 cfs, five at 1,130 cfs, and four at 1,067 cfs. Water is pumped into the California Aqueduct, which extends 444 miles into southern California.

Operation of the SWP, in combination with CVP export operations, influences the hydrologic conditions within south-Delta channels. For example, export operations have an effect on water surface elevations within the south-Delta and subsequently operations of a number of siphons and irrigation pump diversions, which is being addressed, in part, through seasonal construction and operations of temporary barriers within the south-Delta channels. Export operations also influence water currents (both the direction and velocity) within various south-Delta channels, with the primary hydrologic effects occurring within Old and Middle rivers. Export operation effects on hydrologic conditions, and associated effects on habitat quality and availability for various fish and macroinvertebrates and the risk of entrainment and salvage at the CVP and SWP export facilities have been the subject of a number of programs. As a result, a number of management actions, including seasonal reductions in CVP and SWP export rates relative to Delta inflow (export/inflow [E/I] ratio) and other actions such as short-term reductions in export operations based on actual observed salvage of sensitive fish species as part of CALFED Environmental Water Account actions or in

response BOs, have been implemented to reduce or avoid adverse effects of changes in hydrologic conditions and the vulnerability of species to salvage operations.

Currently, average daily diversions are limited during most of the year to 6,680 cfs, as set forth by Corps' criteria dated October 13, 1981. Diversions may be increased by one-third of San Joaquin River flow at Vernalis during mid-December to mid-March if that flow exceeds 1,000 cfs. The maximum diversion rate during this period would be 10,300 cfs, the nominal capacity of the California Aqueduct. In 2000 through 2008, the Corps has authorized use of an additional 500 cfs of Banks Pumping Plant capacity in July through September, which has been used to make up export supply lost during pumping curtailments undertaken during other months for fish protection.

### 4.2.3 Environmental Consequences

**Middle Fork Project Streams and Creeks**
There will be no noticeable change in flows in any of the streams or creeks within the Middle Fork Project area, in particular the Middle Fork American River below French Meadows Reservoir or in the Rubicon River below Hell Hole Reservoir, down to Ralston Afterbay Reservoir relative to the no action alternative.

**Lower American River Below Nimbus Dam**
Under the proposed Action Alternative, the transfer water would be released from the Middle Fork Project Reservoirs and after leaving the Ralston Afterbay travel down the Middle Fork of the American River to Folsom Reservoir. Water releases attributed to the transfer will be made below Nimbus Dam during July, August, and September of 2009. Flows in the lower American River below Nimbus Dam would remain the same as the No Action Alternative except for these three months (**Table 1.—see Chapter 3**).

## 4.3 Biological Resources

This section presents the affected environment and environmental consequences for fisheries, biological, and aquatic resources under the proposed action alternative.

The analysis of potential effects on fisheries and aquatic resources includes an assessment of the fisheries of Middle Fork Project reservoirs (French, Hell Hole and Ralston Afterbay) and Folsom Reservoir; an assessment of fishery resources of the Middle Fork American River below Ralston Afterbay and Oxbow Powerhouse, the North Fork American River below the confluence with the Middle Fork American River; the lower American River below Nimbus Dam to its confluence with the Sacramento River; the lower Sacramento River (below confluence with the American River); and the Delta down into the SDCWA service area. The transfer water will not be stored in the San Luis Reservoir. The analysis of the potential effects on fisheries and aquatic resources associated with the proposed action alternative was based on criteria specific to the effected waterbodies.

### 4.3.1 Terrestrial and Riparian Resources

See Appendix A for detailed species list.

#### 4.3.1.1 Regulatory Setting

**Federal Endangered Species Act**
The ESA requires that both USFWS and NMFS maintain lists of threatened species and endangered species. An "endangered species" is defined as "…any species which is in danger of extinction throughout all or a significant portion of its range." A "threatened species" is defined as"…any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" (16 USC 1532). Section 9 of the ESA makes it illegal to "take" (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in such conduct) any endangered species of fish or wildlife, and regulations contain similar provisions for most threatened species of fish and wildlife (16 USC 1538).

Section 7 of the ESA requires all Federal agencies to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat. To ensure against jeopardy, each Federal agency must consult with USFWS or NMFS, or both, if the Federal agency determines that its action might impact a listed species. NMFS jurisdiction under the ESA is limited to the protection of marine mammals and fishes and anadromous fishes; all other species are within USFWS jurisdiction.

### 4.3.2 Fisheries and Aquatic Resources

See Appendix A for detailed species list.

#### 4.3.2.1 Regulatory Setting

**Critical Habitat**
Critical habitat for listed species consists of (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the Endangered Species Act, on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provision of Section 4 of the Act, upon a determination by the Secretary of the Department of the Interior or Commerce that such areas are essential for the conservation of the species.

**Essential Fish Habitat**
Section 305(b)(2) of the 1996 reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) added a provision for Federal agencies to consult with National Marine Fisheries Service (NMFS) on impacts to EFH. EFH includes specifically identified waters and substrate necessary for fish spawning, breeding, feeding, or growing to maturity. Consultation on any activity that might adversely affect EFH is required by NMFS under the MSFCMA, as amended by the Sustainable Fisheries Act of 1996. EFH includes all habitats necessary to allow the production of commercially valuable aquatic species, to support a long-term sustainable fishery, and contribute to a healthy ecosystem.

**Central Valley Project Improvement Act and Anadromous Fish Restoration Program**
The CVPIA (Title 34 of P.L. 102-575) amends the authorization of the CVP to include fish and wildlife protection, restoration, and mitigation as project purposes of the CVP having equal priority with irrigation and domestic uses of CVP water. It also elevates fish and wildlife enhancement to a level having equal purpose with power generation.

The CVPIA identifies several goals to meet these new purposes. Significant among these is the broad goal of restoring natural populations of anadromous fish, green and white sturgeon American shad, and striped bass in Central Valley rivers and streams to double their recent average levels.

Section 3406(b)(1) jointly imparted the responsibilities of implementing the CVPIA to the USFWS and Reclamation, although the USFWS has assumed the lead role in the development of the Anadromous Fish Restoration Program (AFRP). The Final Restoration Plan for the AFRP was adopted on January 9, 2001 and will be used to guide the long-term development of the AFRP. Additionally, under USFWS direction, technical teams have assisted in the establishment of components of the AFRP. A key element of the program is instream flow recommendations, including objectives for the lower American River and upper Sacramento River.

## 4.3.2.2 Affected Environment
Same resources are affected as in sections 4.3.1.1 and 4.2.1.

## 4.3.2.3 Environmental Consequences-No Action Alternative

### 4.3.2.3.1 Reservoirs
To evaluate the potential effects of the proposed water transfer on reservoir fisheries, seasonal changes in storage under the No Action Alternative (i.e., without transfer) and the proposed action alternative (i.e., with transfer) conditions was examined. The values for reservoir end-of-month storage at French Meadows and Hell Hole reservoirs were determined from the PG&E monthly operations forecast. End-of-month storage at Folsom reservoir under the No Action Alternative was obtained from Reclamation's operations forecast. Differences in end of month storages between the proposed action and the No Action Alternative were used to evaluate the potential for reduced physical habitat availability and coldwater pool volume in the Action Area reservoirs. Also, using reservoir specific area–capacity curves, estimates for storage changes were translated into relative changes in water surface evaluations. The estimated values for changes in water surface elevations were used to examine the potential for increases in the frequency of warmwater fish nest-dewatering events.

**Cold Water Fisheries**
During the period when Action Area reservoir is thermally stratified (generally April to November), coldwater fish in the reservoir reside primarily within the reservoir's metalimnion (middle of the reservoir) and hypolimnion (near bottom) where water temperatures remain suitable. Reduced reservoir storage during this period could reduce the reservoir's coldwater pool volume, thereby reducing the quantity of habitat available to coldwater fish species during these months. Reservoir coldwater pool size generally decreases as reservoir storage decreases, although not always in direct proportion because of

the influence of reservoir basin morphometry. Therefore, to assess potential storage-related effects to coldwater fish habitat availability in French Meadows, Hell Hole, and Folsom reservoirs, end-of-month storage for each reservoir under the proposed action alternative was compared to end-of-month storage under the No Action Alternative for each month that the transfer would be occurring (July-September period). Substantial reductions in reservoir storage were considered to result in substantial reductions in coldwater pool volume and, therefore, habitat availability for coldwater fish.

The criteria used to evaluate potential effects to the coldwater fisheries in Action Area reservoirs are as follows:

- Decrease in reservoir storage, which also would reduce the coldwater pool, relative to the No Action Alternative, of sufficient magnitude or duration to adversely affect coldwater fish during the July to September period.

An annual temperature management plan was submitted to NMFS specifying a 68°F temperature target at Watt Avenue to maintain temperature objectives on the Lower American River for Central Valley Steelhead in April of 2009. This Plan was then subsequently revised to account for improved reservoir storage conditions and increased cold water pool volume based on updated projections. NMFS received an update to the Plan in May of 2009 that included a temperature objective of 67°F at Watt Avenue reflective of these improved conditions. This temperature objective also reserved the last pair of temperature shutters for fall-run Chinook salmon spawning. Reclamation continues to discuss the temperature objectives with NMFS and at the American River Group meetings in order to provide temperature conditions optimal for juvenile steelhead rearing in the lower American River (Action II.2. Lower American River Temperature Management, NMFS BO, 2009)

**Warm Water Fisheries**

Because warmwater fish species in reservoirs (including black bass, largemouth bass, smallmouth bass, spotted bass, green sunfish, crappie, and catfish) use the warm upper layer of the reservoirs and nearshore littoral habitats throughout most of the year, seasonal changes in reservoir storage, as it affects reservoir water surface elevation (feet mean sea level), and the rates at which water surface elevation change during specific periods of the year, can directly affect the reservoir's warmwater fish resources. Reduced water surface elevations can potentially reduce the availability of nearshore littoral habitats used by warmwater fish for rearing, thereby potentially reducing rearing success and subsequent year-class strength. In addition, decreases in reservoir water surface elevation during the primary spawning period for warmwater fish nest building may result in reduced initial year-class strength through warmwater fish nest "dewatering."

Given the differences in geography and altitude among the reservoirs within the Action Area, warmwater fish spawning and rearing periods vary somewhat among reservoirs. Although black bass spawning may begin as early as February, or as late as May, in various California reservoirs, and may possibly extend to July in some waters, the majority of black bass and other centrarchid spawning in California occurs from March through May (Lee 1999; Moyle 2002). However, given the geographical and altitudinal variation among the Action Area reservoirs, in order to examine the potential of nest dewatering events to occur, the

warmwater fish-spawning period is assumed to extend from March through June. Since this time frame is outside the Proposed Action Alternative transfer time frame, no further analysis was conducted on the potential for nest dewatering to occur. Additionally, to encompass all reservoirs included in the Action Area, the period of April through November is appropriate for assessing effects on warmwater juvenile fish rearing.

To evaluate potential effects, under the action alternative relative to the No Action Alternative the following criteria are used to evaluate potential effects on largemouth bass, smallmouth bass, and ultimately warmwater fish, in general:

- Additional decreases in water surface elevations of sufficient magnitude from July through September to appreciably reduce the availability of nearshore littoral habitats used by warmwater fish for rearing, thereby potentially reducing rearing success and subsequent year-class strength of warmwater juvenile fish rearing under the action alternative relative to the No Action Alternative.

#### 4.3.2.3.2 Rivers

Instream flow and water temperature are important parameters related to the production and condition of aquatic resources in riverine environments. Instream flow, and the magnitude and duration of flow fluctuation events, may affect fish populations, particularly salmonid populations, by determining the amount of available habitat or altering the timing of life history events (e.g., spawning). Rapid changes in flow have the potential to affect the survival of eggs and alevins by exposing redds, and rapidly receding flow conditions may strand juveniles in pools and side channels or on beach substrates where desiccation, rapidly increasing water temperature, and predation may affect overall survival. In addition, water temperatures influence metabolic, physiologic, and behavioral patterns, as well as fecundity and overall spawning success of fish populations (SWRI 2003).

The general criteria used to evaluate potential effects to fisheries and other aquatic resources in the Action Area rivers are as follows:

- Decrease in river flows or increase in water temperatures, under the proposed action alternative relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce the habitat suitability of river fisheries and aquatic resources, or result in redd dewatering or juvenile stranding.

All the releases for this transfer out of the Middle Fork Project reservoirs travel through manmade tunnels with a capacity of 1,000 cfs. The transfer water will be released to the Middle Fork of the American River through Oxbow Powerhouse at Ralston Afterbay. As the map indicates (Figure 4.3-1), water from French Meadows Reservoir travels through the French Meadows-Hell Hole tunnel and generates power. From the Hell Hole Reservoir water travels down the long series of tunnels and powerhouses depicted until it reaches the river at the Middle Fork (MF) of the American River at the Ralston Afterbay. There will be no change in flows in any of the streams or creeks between French Meadows and Hell Hole reservoirs and Ralston afterbay; for example, in the MF American river below French Meadows Reservoir or in the Rubicon river below Hell Hole Reservoir, down to Ralston Afterbay reservoir.

In the lower American and Sacramento rivers, evaluation of potential effects resulting from changes in river flows and water temperature under the Proposed Action relative to the No Action Alternative focused on the species of primary management concern (e.g., anadromous salmonids and green sturgeon). Because anadromous salmonids (i.e., winter-run Chinook salmon, spring-run Chinook salmon, fall/late fall-run Chinook salmon, and Central Valley steelhead) are known to use the lower American River and Sacramento Rivers during discrete time periods associated with specific lifestages, potential effects were evaluated using species-specific assessment parameters, where appropriate.

The effects analysis focused on determining potential effects to anadromous salmonids because their life history requirements are generally more restrictive than those of other fish species found in the rivers. Thus, if anadromous salmonids are not affected by the Proposed Action relative to the No Action Alternative, it is unlikely that other, less sensitive fish species (e.g., splittail, American shad and striped bass) would be affected. The criteria used to evaluate potential effects on anadromous salmonids in the lower American River and the Sacramento River below its confluence with the American River, are as follows:

- Decrease in river flows or increase in water temperatures, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to notably reduce the suitability of habitat conditions during adult immigration.
- Decrease in river flows or increase in water temperatures, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce spawning habitat availability and incubation.
- Decrease in flow and associated decrease in stage, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to notably increase redd dewatering or juvenile stranding.
- Decrease in flow or increase in water temperature, under the action alternatives relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce the suitability of habitat conditions during juvenile rearing.

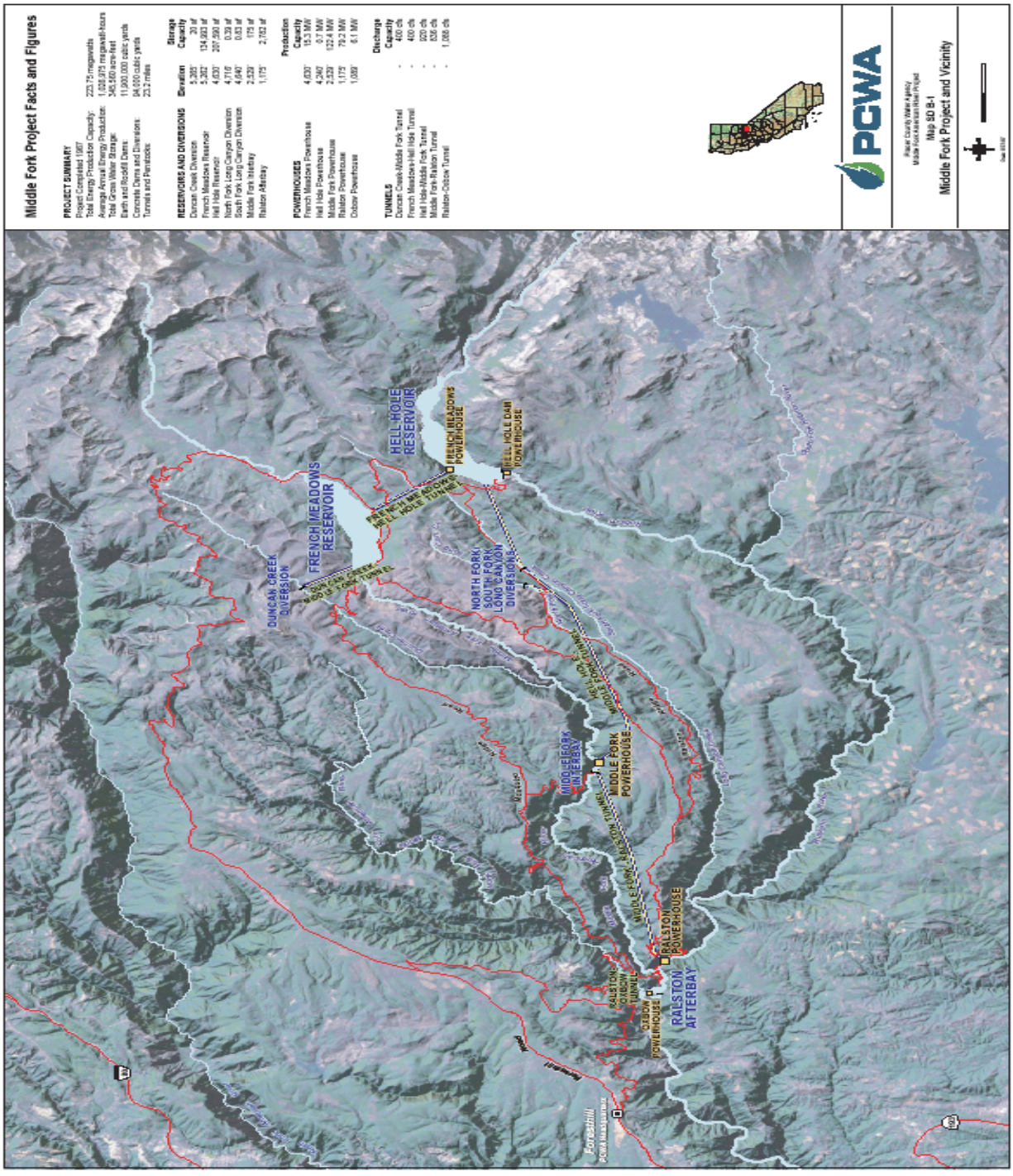


**Figure 4.3-1**. Middle Fork Project Area

## 4.3.2.4 Environmental Consequences-Proposed Action Alternative

### 4.3.2.4.1. Middle Fork Project Reservoirs

Operations of the MFP under existing conditions currently result in highly variable flows on a daily and weekly basis from the point where the water is released on the Middle Fork American River (at Oxbow Powerhouse) to Folsom Reservoir. The overall general increased discharge under the action alternative, relative to the No Action Alternative, would result in a temporal increase in exposure to higher average daily flows from July through September 2009. This temporal increase is over the base flows that are anticipated at the time of the transfer and includes the management of releases for project purposes in support of Central Valley Operations. The increased flow, at the point where the transfer water is released to the Middle Fork of the American River from Oxbow Powerhouse at Ralston Afterbay dam, could enhance instream habitat conditions for rainbow and brown trout, a primary component of the coldwater fishery in the Middle Fork American River. Also, changes in the flow regime associated with the action alternative relative to the No Action Alternative could increase the forage base of fish species in the Middle Fork American River. Periodic dewatering of the stream margins during hydroelectric peaking operations has been shown to limit the ability of aquatic invertebrates to colonize these areas and achieve the densities that occur in areas that are constantly submerged (Gislason 1985). Differences in flow regime may provide a partial explanation for somewhat higher aquatic invertebrate diversity (taxa richness) in the control reaches where flows are relatively stable during the summer and fall. Aquatic invertebrates such as stoneflies, which may contribute to the forage base for fish, are more likely to successfully colonize and reproduce in an environment with more stable flow conditions.

Regulated stream flows under the proposed action alternative would not fluctuate beyond existing minimum and maximum ranges. Therefore, no effects to aquatic macroinvertebrate habitat availability are anticipated, relative to the No Action Alternative. The increased flow releases under the proposed action alternative would not increase the magnitude of flows in the Middle Fork American River and therefore, would not affect benthic macroinvertebrate assemblages, relative to the No Action Alternative. Also, the magnitude or velocity of flow releases under the proposed action alternative would not increase above current peaking levels; therefore, there is no additional risk of potentially disrupting or displacing benthic macroinvertebrates or suitable habitat, relative to the No Action Alternative.

It is anticipated that the released water temperatures from Oxbow Powerhouse would not notably change with the implementation of the proposed action alternative relative to the No Action Alternative. Therefore, it is expected that water temperatures in the Middle Fork American River below Oxbow Powerhouse would not noticeably change with the implementation of the action alternative, relative to the No Action Alternative.

In conclusion, changes in flow and water temperature from July – September 2009, as attributed to the water transfer (i.e., Proposed Action Alternative) would not result in appreciable effects to fisheries and aquatic resources in Middle Fork American River relative to the No Action Alternative.

**Hell Hole Reservoir** Under the Proposed Action Alternative, storage at Hell Hole Reservoir would be reduced during July-September 2009, relative to the No Action

Alternative. Storage would decrease by up to 20,000 AF by the end of September 2009 based on information provided by PCWA. Under the No Action Alternative, end of September storage is expected to be approximately 104,100 AF, and 84,100 AF under the Proposed Action Alternative. Under the Proposed Action Alternative, storage in Hell Hole Reservoir would remain well within historical ranges, and above FERC minimum specified storage levels.

***Coldwater Fisheries*** Hell Hole Reservoir supports coldwater recreational fisheries for resident rainbow and brown trout, and may also support lake trout and Kokanee salmon populations. The anticipated decreases in reservoir storage would not be expected to notably affect the reservoir's coldwater fisheries because: (1) coldwater habitat would remain available within the reservoir during all months of the April through November period; (2) physical habitat availability would not be substantively reduced; and (3) anticipated seasonal reductions in storage would not be expected to notably affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage under the Proposed Action Alternative relative to the No Action Alternative would not result in effects to coldwater fish resources in Hell Hole Reservoir.

***Warmwater Fisheries*** Warmwater fisheries also are reported to exist in Hell Hole Reservoir, including smallmouth bass, catfish, and sunfish. Fish production in the reservoir is believed to be limited by relatively cold water temperatures and large seasonal fluctuations in water levels and low productivity compared to natural lakes (Jones and Stokes 2001). Under the No Action Alternative, end of September 2009 storage is expected to be approximately 104,100 AF, and 84,100 AF under the Proposed Action Alternative. Application of area-capacity curves indicates that this 20,000 AF storage reduction would correspond to an approximate reduction in the end of September 2009 water surface elevation of 25 feet. However, the spawning period for warmwater fish is believed to generally extend from March through June. Anticipated reductions in water surface elevations associated with the Proposed Action Alternative relative to the No Action Alternative would not be expected to be of sufficient magnitude or duration to notably affect the April through November availability of nearshore littoral habitats used by warmwater fish for rearing. Consequently, potential reductions in water surface elevations under the Proposed Action Alternative relative to the No Action Alternative would not be expected to appreciably affect the warmwater fisheries in Hell Hole Reservoir.

#### 4.3.2.4.2 Lower American River

The total transfer release under the Proposed Action Alternative would be approximately 100-800 cfs higher from July through September 2009 than flows expected under the No Action Alternative on the lower American River below Nimbus Dam. Following is a discussion of potential effects to various fish species/life stages associated with these changes in flow.

In addition to flow, water temperature is an important consideration for the lower American River, particularly for fall-run Chinook salmon and Central Valley steelhead. Seasonal releases from Folsom Reservoir's coldwater pool influence thermal conditions for the lower American River. Folsom Reservoir's coldwater pool oftentimes is not large enough to allow for coldwater releases during the warmest months (i.e., July through September) to provide

maximum thermal benefits to steelhead, and coldwater releases during October and November for fall-run Chinook salmon immigration, spawning, and incubation. This year several significant rain events in April and May have lead to the favorable lake storage and cold-water pool conditions that will enable a 67ºF temperature target at Watt Avenue (email communication with Brian Ellrott, NMFS, June 2009) to be met throughout the season, while also reserving some cold water for the fall-run Chinook salmon (see additional discussion above—Section 4.3.2.3.1).

Due to anticipated end-of-September reservoir storage and cold water pool volume, a power bypass may not be necessary this year—i.e., water will continue to be drawn through the power penstock intake structure at Nimbus Dam.

**Adult Fall-run Chinook Salmon/Steelhead Immigration** Adult upstream immigration of fall-run Chinook salmon generally occurs from August through December, whereas steelhead adult immigration generally occurs from December into March, The adult fall-run Chinook salmon immigration time frame includes the period of changes in flow released from Nimbus Dam associated with the Proposed Action Alternative relative to the No Action Alternative. The increased flow rates associated with the Proposed Action Alternative relative to the No Action Alternative in the lower American River below Nimbus Dam would not be expected to reduce the attraction of adults immigrating into the lower American River, nor be of sufficient magnitude to encourage additional straying into the lower American River. Although physical passage impediments are not believed to occur in the lower American River, increased flows (100-800 cfs) associated with the Proposed Action Alternative have the potential to facilitate the upstream migration of adult fall-run Chinook salmon.

It is anticipated that the release water temperatures from Nimbus Dam would not appreciably change with the implementation of the Proposed Action Alternative relative to the No Action Alternative. Therefore, it is expected that water temperatures in the lower American River would not noticeably change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

During the adult fall-run Chinook salmon immigration periods potentially affected by the Proposed Action Alternative relative to the No Action Alternative, changes in river flow or water temperature of sufficient magnitude or duration would not occur in the lower American River to affect adult immigration.

**Adult Fall-run Chinook Salmon Spawning and Egg Incubation** Fall-run Chinook salmon spawning in the lower American river generally occurs from October to December; outside the time frame of the proposed transfer (Action Alternative).

Also, the increase in inflow to Folsom Reservoir during July-September under the Proposed Action Alternative relative to the No Action Alternative and release of the water in the July-September period is not expected to appreciably decrease coldwater pool availability in Folsom Reservoir, nor affect the efficacy of the anticipated hydropower bypass release during fall 2009. It is anticipated that the boundary condition release water temperatures from Nimbus Dam would not notably change with the implementation of the Proposed Action Alternative relative to the No Action Alternative. Therefore, it is expected that water

temperatures in the lower American River would not notably change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

Examination of the cumulative redd depth distribution included in the IFIM study conducted by USFWS (2003) indicate that the shallowest fall-run Chinook salmon redds were located in about 0.4 feet (about 5 inches) deep water. Since the proposed action alternative would not occur during the time of fall-run Chinook salmon spawning (mid-October, if cool enough) a change in stage associated with cessation of the transfer would not be expected to dewater any fall-run Chinook salmon redds.

During the adult fall-run Chinook salmon adult spawning and egg incubation period potentially affected by the Proposed Action Alternative relative to the No Action Alternative, river flow fluctuations or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to appreciably affect adult fall-run Chinook salmon spawning and egg incubation.

**Adult Steelhead Spawning and Egg Incubation** In the lower American River, steelhead spawning generally extends from late-December to April. Therefore, steelhead spawning and egg incubation does not have the potential to be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Juvenile Fall-run Chinook Salmon and Steelhead Rearing and Emigration** The juvenile fall-run Chinook salmon rearing and emigration period extends from late-December into June. Therefore, juvenile fall-run Chinook salmon rearing and emigration do not have the potential to be appreciably affected under the Proposed Action Alternative relative to the No Action Alternative.

The primary period of steelhead smolt emigration occurs from March through June (Castleberry et al. 1991). It has been reported that steelhead move downstream as young-of-the-year (YOY) in the lower American River (Snider and Titus 2000b) from late-spring through summer. Nonetheless, some juvenile steelhead rearing is believed to occur year-round in the lower American River. The temporary increase in flow rates associated with the Proposed Action Alternative from July through September 2009 relative to the No Action Alternative in the lower American River below Nimbus Dam would not be expected to appreciably increase the amount of habitat available for juvenile steelhead rearing. From July to September, it is expected that water temperatures in the lower American River would not change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

Stage reductions can be bracketed depending on the beginning and ending release amounts as follows: if releases begin at 4,000 cfs an 800 cfs reduction would drop the stage 0.4 foot and a 100 cfs reduction would drop the stage by 0.04 foot (from Fair Oaks gauge rating). Whereas, if releases begin at 2,500 cfs an 800 cfs reduction would drop stage by 0.59 foot and a 100 cfs reduction would drop stage by 0.06 foot. These changes in stream flow stage would not be expected to result in juvenile stranding, particularly because steelhead present during this time of year would be expected to be larger individuals with increased swimming capability. However, if cessation of the transfer water releases should result in Lower

American River flow fluctuations above and below the threshold flow of 4,000 cfs (NMFS BO, Action II.4.), fisheries monitoring would occur to determine if potentially affected species are present in the proposed action area (see page 6 of the RPA—monitoring of actions when most needed). One potential mechanism for this monitoring is through coordination with the respective agencies identified in the Interagency Fishery Rescue Strategy (see Appendix VI). Therefore, during the juvenile steelhead rearing period potentially affected by the Proposed Action Alternative relative to the No Action Alternative, river flow decreases or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to affect juvenile steelhead rearing.

**American Shad** American shad immigration generally occurs from April through June, with corresponding spawning and egg incubation occurring from mid-May through June. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, American shad would not be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Striped Bass** Striped bass spawning, embryo incubation, and initial rearing period may begin in April, but generally peaks in May and early-June. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, striped bass spawning, embryo incubation, and initial rearing period would not be affected under the Proposed Action Alternative relative to the No Action Alternative. In the lower American River, sub adult and adult striped bass have been observed opportunistically foraging during other months of the year. However, because flows under the Proposed Action Alternative relative to the No Action Alternative would not appreciably change throughout the year, striped bass would not be notably affected under the Proposed Action Alternative relative to the No Action Alternative.

**Sacramento Splittail** Sacramento splittail spawning, egg incubation, and initial rearing can occur between late February and early July, but peak spawning occurs in March and April. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, Sacramento splittail spawning, embryo incubation, and initial rearing would not be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Other Fish Species** The life history requirements of anadromous salmonids are generally more restrictive than those of other fish species found in the river. Thus, if anadromous salmonids are not notably affected by the Proposed Action Alternative relative to the No Action Alternative, it is unlikely that other, less sensitive fish species would be appreciably affected. Because river flow decreases or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to appreciably affect anadromous salmonids, as well as American shad, striped bass and Sacramento splittail, other fish species in the lower American River also would not be appreciably affected under the Proposed Action Alternative relative to the No Action Alternative.

#### 4.3.2.4.3 Folsom Reservoir

Under the Proposed Action Alternative, Folsom Reservoir storage may increase temporarily during the course of the water transfer. End of September 2009 storage in Folsom Reservoir is expected to be 500,000 AF under the No Action Alternative, and 500,000 AF under the

Proposed Action Alternative.

***Coldwater Fisheries***

The anticipated increase in reservoir storage would not be expected to notably affect Folsom Reservoir's coldwater fisheries because: (1) coldwater habitat would remain at the same or slightly higher levels within the reservoir during all months of the transfer period; (2) physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations; and (3) anticipated seasonal changes in storage would not be expected to notably affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage under the Proposed Action Alternative relative to the No Action Alternative would not result in notable effects to coldwater fish resources in Folsom Reservoir.

***Warmwater Fisheries***

Folsom Reservoir's warmwater fish species (e.g., bass, sunfish, crappie, and catfish) utilize the warm upper layer of the reservoir and nearshore littoral habitats throughout much of the year. Changes in reservoir storage, as it affects reservoir water surface elevation can affect the reservoir's warmwater fisheries resources. Reduced water surface elevations can reduce the availability of nearshore littoral habitats used by warmwater fishes for spawning and rearing. Under the Proposed Action Alternative, storage in Folsom Reservoir is not expected to increase, relative to the No Action Alternative. Therefore, the Proposed Action Alternative would not be expected to appreciably affect nearshore littoral habitat for spawning and rearing warmwater fisheries in Folsom Reservoir.

**4.3.2.4.4 Sacramento River**

The total transfer release under the Proposed Action Alternative would be approximately 100-800 cfs higher from July through September 2009 than flows expected under the No Action Alternative on the Sacramento River below its confluence with the lower American River. Following is an assessment of potential effects to fish and aquatic resources in the lower Sacramento River.

**Winter-run Chinook Salmon** Adult winter-run Chinook salmon immigration and holding in the Sacramento River occurs from December through July, with a peak during the period extending from January through April. Relatively minor potential changes in flow or water temperature would not be of sufficient magnitude or duration to affect the physical habitat availability or water temperature suitability of winter-run Chinook salmon adult immigration and holding under the Proposed Action Alternative relative to the No Action Alternative. Winter-run Chinook salmon primarily spawn in the main-stem Sacramento River between Keswick Dam (RM 302) and Red Bluff Diversion Dam (RM 243) between late-April and mid-August, with a peak generally in June. Winter-run Chinook salmon embryo incubation in the Sacramento River can extend into October. Therefore, due to the extent of Proposed Action Alternative project area that includes the Lower Sacramento River (below confluence with American River), winter-run Chinook salmon spawning and incubation would not be affected by the Proposed Action Alternative relative to the No Action Alternative.

Winter-run Chinook salmon fry rearing and emigration occurring in the upper Sacramento River can extend from June through April. Emigration of winter-run Chinook salmon juveniles past Knights Landing, approximately 155.5 river miles downstream of the Red Bluff Diversion Dam, reportedly occurs between November and March, peaking in December, with some emigration continuing through May in some years. Due to the area of impact (lower Sacramento River) the Proposed Action Alternative would not affect the magnitude or duration of physical habitat availability or water temperature suitability of winter-run Chinook salmon juvenile rearing and emigration.

**Spring-run Chinook Salmon** Adult spring-run Chinook salmon spawning has been reported to occur from September through December, with spawning peaking in mid-September. Embryo incubation generally occurs from September through March. However, there is no spawning habitat in the lower Sacramento so there would be no effect on spawning habitat in the Sacramento River, for any runs. Therefore, the Proposed Action Alternative and the No Action Alternative, critical habitat for the spring-run Chinook salmon in the Sacramento River would not be affected.

**Fall-run Chinook Salmon** Adult fall-run Chinook salmon generally begin migrating upstream annually as early as June, with immigration continuing through December in most years. Adult fall-run Chinook salmon immigration generally peaks in October, and typically greater than 90 percent of the run has entered the American River by the end of November. The slightly higher flows during the transfer would provide additional flow cues, particularly for American River bound fish, but overall immigration conditions would not appreciably change. Therefore, no affects on the physical habitat availability or water temperature suitability of fall-run Chinook salmon adult immigration under the Proposed Action Alternative relative to the No Action Alternative are likely.

There is no fall-run Chinook salmon spawning habitat in the lower Sacramento River. Therefore, there would be no affects on spawning habitat availability under the Proposed Action Alternative or the No Action Alternative.

Fall-run Chinook salmon fry emergence generally occurs from late-December through March, and juvenile rearing and emigration occurs from January through June. However, no spawning for any of the Chinook salmon runs occurs in the lower Sacramento River. Therefore, no affects to fry emergence would result from the Proposed Action Alternative or the No Action Alternative.

**Late Fall-Fun Chinook Salmon** Late fall-run Chinook salmon immigration in the Sacramento River occurs from October through April, with a peak during December therefore, would not be affected by the Proposed Action Alternative relative to the No Action Alternative.

Late fall-run Chinook salmon spawn in the Sacramento River from early January to March, with embryonic incubation extending from January to June. Therefore, late fall-run Chinook salmon spawning and incubation would not be affected by the Proposed Action Alternative relative to the No Action Alternative.

Post-emergent fry and juveniles emigrate from their spawning and rearing grounds in the upper Sacramento River and its tributaries during the April through December period. Juvenile rearing can extend from seven to thirteen months in the Sacramento River subsequent to emergence. The slight decrease in flow at the cessation of the water transfer would not result in an appreciable change in stage, and would not be expected to result in juvenile stranding. Relatively minor potential changes in flow or water temperature would not be of sufficient magnitude or duration to affect the physical habitat availability or water temperature suitability of late fall-run Chinook salmon juvenile rearing and emigration.

**Steelhead** Adult steelhead immigration generally can extend from August into March, with peak immigration during January and February. Relatively minor potential changes in flow or water temperature would not be of sufficient magnitude or duration to affect the physical habitat availability or water temperature suitability of steelhead adult immigration under the Proposed Action Alternative relative to the No Action Alternative.

Spawning usually begins during late-December and may extend through March, but also can range from November through April. Embryo incubation can generally extend from November to May. Therefore, the Proposed Action Alternative is not anticipated to affect spawning habitat suitability for steelhead.

Juvenile steelhead rearing can extend year-round in the Sacramento River, and the primary period of steelhead smolt emigration occurs from March through June. Thus, smolt emigration would not be expected to be affected by implementation of the Proposed Action Alternative relative to the No Action Alternative. Relatively minor potential changes in flow or water temperature would not be of sufficient magnitude or duration to affect the physical habitat availability or water temperature suitability of steelhead juvenile rearing. Under the Proposed Action Alternative, critical habitat for the Central Valley steelhead in the Sacramento River would not be affected relative to the No Action Alternative.

**Green Sturgeon** Green sturgeon generally begin their inland migration in late-February, and enter the Sacramento River between February and late-July. Spawning activities occur from March through July, with peak activity believed to occur between April and June. The changes in flow and temperature resulting from the Proposed Action Alternative are not expected to change green sturgeon immigration and spawning behavior in the Sacramento River relative to the No Action Alternative.

Juvenile green sturgeon reportedly rear in their natal streams year-round. Relatively minor potential changes in flow or water temperature would not be of sufficient magnitude or duration to affect the physical habitat availability or water temperature suitability of green sturgeon juvenile rearing.

**American Shad** American shad immigration and spawning generally occurs from mid-May through June, which is outside the Proposed Action Alternative period. Therefore, American shad immigration and spawning are not expected to change under the Proposed Action Alternative relative to the No Action Alternative.

**Striped Bass** Striped bass spawning, embryo incubation, and initial rearing in the Sacramento River would not be affected by the Proposed Action Alternative relative to the No Action Alternative, because flows during the period of these lifestages would not change under the Proposed Action Alternative relative to the No Action Alternative.

**Sacramento Splittail** Sacramento splittail spawning, egg incubation, and initial rearing can occur between late February and early July, with peak spawning occurs in March and April. Therefore, Sacramento splittail do not have the potential to be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Other Fish Species** The life history requirements of anadromous salmonids are generally more restrictive than those of other fish species found in the river. Thus, if anadromous salmonids are not notably affected by the Proposed Action Alternative relative to the No Action Alternative, it is unlikely that other, less sensitive fish species would be appreciably affected. Because river flow decreases or water temperature increases of sufficient magnitude or duration would not occur in the Sacramento River to notably affect anadromous salmonids, as well as American shad, striped bass and Sacramento splittail, other fish species in the Sacramento River also would not be notably affected under the Proposed Action Alternative relative to the No Action Alternative.

#### 4.3.2.4.5 Sacramento-San Joaquin Delta

Changes in flows in the lower American and Sacramento rivers, or export pumping, over the course of 2009 would not be significant in the July to September period. Delta smelt and other fish of concern are not located in the South Delta region near the export pumps at this tmie of year. D 1641 Delta outflow and salinity requirements would be met for protection of the beneficial uses in the Delta.

## 4.4 Socioeconomics

This section presents the affected environment and environmental consequences for water resources.

### 4.4.1 Regulatory Setting

Under NEPA, the definition of "human environment" states that economic or social effects are not intended, by themselves, to require preparation of an Environmental Impact Statement (EIS) or an EA; however, when an EIS or EA is prepared, the economic and social effects must be discussed if they are interrelated to the natural or physical environmental effects.

### 4.4.2 Affected Environment

Same as in sections 4.3.1.1 and 4.2.1.

### 4.4.3 Environmental Consequences

The proposed action will have a slightly positive effect on socioeconomics of the SDCWA service area.

The transfer of 20,000 acre feet of water to SDCWA would provide some relief to the area in this dry year. The proposed action would not induce population growth within SDCWA Service Area, nor would seasonal labor requirements change. Agriculturally dependent businesses would not be affected by the proposed action. No adverse effects to public health and safety would occur. The proposed action would not have highly controversial or uncertain environmental effects or involve unique or unknown environmental risks. The proposed action would continue to support the economic vitality in the region. Maximizing the use of water transfers is beneficial to local economic conditions. There would be a slight positive impact on localized socioeconomics due the support of sustained M&I water uses.

## 4.5 Recreation

Recreational opportunities (i.e., wildlife viewing, fishing, waterfowl hunting, swimming, motor boating, rafting, sailing, and windsurfing) associated with waterbodies within the Action Area could be affected by changes in reservoir levels and river flows with implementation of the Proposed Action Alternative relative to the No Action Alternative.

**Middle Fork and North Fork American Rivers**

Although the Proposed Action Alternative would transfer water from Hell Hole Reservoir on the Rubicon River, the upstream reach of the Rubicon River between Hell Hole Reservoir and Ralston Afterbay would not change because the water transfer would occur via an enclosed delivery conduit. The upstream river reaches of both the Middle Fork American River and Rubicon River would not be subject to changes in flow, relative to the No Action Alternative, as a result of the proposed water transfer. Therefore, under the Proposed Action Alternative, recreational opportunities in the upstream reaches of both the Middle Fork American and Rubicon rivers would not change, relative to the No Action Alternative.

Below Oxbow Powerhouse on the Middle Fork American River, additional on-peak generation would be needed in order to transfer under the Proposed Action Alternative. The minimum and maximum flow rates for the day would remain the same as under the No Action Alternative; only the duration of the maximum flow would increase for up to ten hours per day during the daily on-peak generation period. Flows in the North Fork American River below the confluence with the Middle Fork American River would be similarly affected.. Hence, under the Proposed Action Alternative, recreational opportunities in the Middle Fork American River below Oxbow Powerhouse and North Fork American River would not be affected, relative to the No Action Alternative.

**Hell Hole Reservoir** Peak recreation season at this reservoir is during the summer months when reservoir elevation is above 106,150 AF (4,540 feet above msl). Boat ramps are most commonly inoperable in the winter months, when use is minimal or the reservoirs are inaccessible due to snow. Under the Proposed Action Alternative, storage at Hell Hole Reservoir would be reduced during the months of November and December 2009, relative to the No Action Alternative. Storage would decrease by up to 20,000 AF by the end of December 2009 based on information provided by PCWA. Therefore, under the Proposed

Action Alternative, storage in Hell Hole Reservoir would remain well within historical ranges, and above FERC minimum specified storage levels. However, it is uncertain whether any storage differences would remain subsequent to the 2009/2010 snowmelt runoff period. Nonetheless, even if this minor reduction in storage were to carry over into the summer of 2009, it would not be expected to substantively reduce recreation opportunities.

Peak recreation season at this reservoir is during the summer months and because there would only be a minor reduction in storage, recreation opportunities at Hell Hole Reservoir would not be affected by the Proposed Action Alternative, relative to the No Action Alternative.

**French Meadows Reservoir** Storage at French Meadows Reservoir would remain essentially equivalent to the No Action Alternative under the action alternatives, based upon information provided by PCWA. The storage in French Meadows Reservoir under the No Action Alternative and the action alternatives is estimated to range from 59,600 AF (at the beginning of November 2008) to 60,000 AF (end of December 2008). Because storage in French Meadows Reservoir is identical under the No Action and action alternatives, no further description or assessment of potential storage-related effects in French Meadows Reservoir is warranted.

**Lower American River**
The total transfer release under the Proposed Action Alternative during July through September would be approximately 100-800 cfs higher than flows expected under the No Action Alternative on the lower American River below Nimbus Dam. This increase would not be expected to affect recreational opportunities in the lower American River.

**Folsom Reservoir** Under the Proposed Action Alternative, Folsom Reservoir levels would temporarily increase relative to the No Action Alternative. Because no decreases in reservoir storage would occur under Proposed Action Alternative, recreation opportunities would not be changed.

**Sacramento River**
Under the Proposed Action Alternative, flows in the Sacramento River below Keswick Dam to the confluence with the lower American River will not change from the No Action Alternative.

**Sacramento-San Joaquin Delta**
Under the Proposed Action Alternative, inflows to the Delta would increase by 100 to 800 cfs relative to the No Action Alternative but are anticipated to remain within the range of normal flow ranges and fluctuations resulting from SWP and CVP operations. Therefore, recreation opportunities would not be affected.

## 4.6 Wild and Scenic Rivers

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future

generations. Rivers are classified as wild, scenic, or recreational. Within the action area, the North Fork of the American River and the Lower American River are nationally designated as Wild and Scenic Rivers (http://www.rivers.gov/wsr-american-lower.html). The Middle Fork and Lower North Fork of the American River are considered Eligible for National listing as a Wild and Scenic River. The American River's Middle and North Forks are unique river segments in several ways. Rivers are required to have one or more Outstandingly Remarkable Value in order to be considered as eligible for Wild and Scenic designation.

**North Fork American River**

The North Fork of the American River is designated as a National Wild and Scenic River from a point 0.3 miles above Heath Springs downstream to a point 1,000 feet upstream of the Colfax-Iowa Hill Bridge. This stretch of river is 38.3 miles long and is classified as wild. Wild river areas are defined as those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. The eligible section of the North Fork of the American River spans from the Colfax-Iowa Hill Bridge to the intake of the Auburn Dam diversion tunnel.

Downstream from the confluence of the North and Middle Forks of the American River, the North Fork would be affected by the releases from Oxbow Powerhouse on the Middle Fork American River. Additional on-peak generation would be needed in order to transfer under the Proposed Action Alternative. The minimum and maximum flow rates for the day would remain the same as under the No Action Alternative; only the duration of the maximum flow would increase for up to ten hours per day during the daily on-peak generation period. Oxbow Powerhouse on the Middle Fork American River would require additional on-peak generation in order to transfer under the Proposed Action Alternative. The minimum and maximum flow rates for the day would remain the same as under the No Action Alternative; only the duration of the maximum flow would increase for up to ten hours per day during the daily on-peak generation period.

Flows on the North Fork of the American River would remain unaffected with implementation of the Proposed Action Alternative relative to the No Action Alternative because potential changes in the river flows would not be of sufficient magnitude and duration to significantly affect the river.

**Middle Fork American River**

Approximately 23 miles of the Middle Fork of the American River, from Oxbow Dam to the confluence with the North Fork of the American River, are considered eligible to be classified as a Wild and Scenic River. Below Oxbow Powerhouse on the Middle Fork American River, additional on-peak generation would be needed in order to transfer under the Proposed Action Alternative. The minimum and maximum flow rates for the day would remain the same as under the No Action Alternative; only the duration of the maximum flow would increase for up to ten hours per day during the daily on-peak generation period. Hence, under the Proposed Action Alternative, recreational opportunities in the Middle Fork American River below Oxbow Powerhouse would not be affected, relative to the No Action Alternative.

**Lower American River**

The Lower American River, from Nimbus Dam to the confluence with the Sacramento River, is classified as a recreational National Wild and Scenic River. This 23 mile stretch of river is the most heavily used recreation river in California. The analysis of potential affects on recreation opportunities associated with implementation of the Proposed Action Alternative within the Action Area was based on potential changes in reservoir levels and river flows of sufficient magnitude and duration to affect recreational opportunities, relative to the No Action Alternative. The total river release under the Proposed Action Alternative approximately 100-800 cfs higher than flows expected under the No Action Alternative on the lower American River below Nimbus Dam. This slight increase (less than 2 inches in river stage) would not be expected to affect recreational opportunities in the Lower American River.

# 4.7 Summary of Impacts

Table 4-7. Summary of Effects of the No Action, Proposed, and Two Action Alternatives for the Execution of a Temporary WA Contract to Deliver Water from PCWA to SDCWA

| Resource | No Action Alternative | Proposed Action Alternative |
|---|---|---|
| Agricultural | No Effect | No Effect |
| Surface Water Quality | No Effect | No Effect |
| Land Use, Planning, and Zoning | No Effect | No Effect |
| Cultural Resources | No Effect | No Effect |
| Recreation | No Effect | No Effect |
| Population and Housing | No Effect | No Effect |
| Hydropower | No Effect | No Effect |
| Public Health and Safety | No Effect | No Effect |
| Indian Trust Assests | No Effect | No Effect |
| Environmental Justice | No Effect | No Effect |
| Sustainability | No Effect | No Effect |
| Irreversible and Irretrievable Commitment of Resources | No Effect | No Effect |
| Climate Change | No Effect | No Effect |
| Cumulative Impacts | No Effect | No Effect |
| Water Supply and Hydrology | No Effect | Desirable Effect |
| Biological Resources/Listed Species | No Effect | No Effect |
| Socioeconomics | Undesirable Effect | Desirable Effect |
| Public Services and Utilities | Undesirable Effect | Desirable Effect |

# 4.8 Flow Schedules

**Lower American River Below Nimbus Dam**

Under the proposed Action Alternative, the transfer water would be released from the Middle Fork Project Reservoirs and after leaving the Ralston Afterbay travel down the Middle Fork of the American River to Folsom Reservoir. Water releases attributed to the transfer will be made below Nimbus Dam during July, August, and September of 2009. Flows in the lower American River below Nimbus Dam would remain the same as the No Action Alternative except for these three months (**Table 3-2**). Consequently, flows would be approximately 100-800 cfs higher than the base flows (No Action Alternative) on average during July-

September transfer time frame below Nimbus Dam (**Table 4-7**). Actual increases in daily flows may vary from these estimates to best manage cold water resources to optimally meet seasonal temperature and flow targets on the lower American River as per recommendations made at the American River Group meetings.

The forecasted 90% exceedence for Lower American River releases (below Nimbus Dam) during the time frame of the Proposed Action, with and without releases related to project are contained in the following table. Average monthly releases (with and without project) are based on forecasted values and are only an outlook of the potential and actual daily values; i.e., flows may be higher or lower than the estimated values appearing in the table. The 20 TAF of transfer water is distributed evenly over the three months (6.67 TAF). The actual monthly amounts may be higher or lower, provided the total amount does not exceed 20 TAF. The carriage loss amount is initially estimated to be 20% and will be accounted for at the end by Department of Water Resources (DWR) and SDCWA as part of deliveries.

**Table 4-8. Average Releases from Nimbus under the No Action and Action Alterative from July 2009 through September 2009**

| | July | August | September |
|---|---|---|---|
| Folsom Inflow **Without** Transfer (AF) | 41,430 | 42,650 | 35,660 |
| Folsom Inflow **With** Transfer (AF) | 48,770 | 50,000 | 40,990 |
| Monthly Average Lower American River Releases **Without** [3]Transfer (cubic-feet per second "cfs") | 4,383 | 3,085 | 1,260 |
| Lower American River Releases **Without** Transfer (AF) | 269,000 | 190,000 | 75,000 |
| Additional Water Released into LAR (AF) (**with** transfer) | 7,340 | 7,350 | 5,330 |

# 4.9 Fisheries and Aquatic Resources

The analysis of potential effects on fisheries and aquatic resources includes an assessment of the fisheries of Middle Fork Project reservoirs (French, Hell Hole and Ralston Afterbay) and Folsom Reservoir; an assessment of fishery resources of the Middle Fork American River below Ralston Afterbay and Oxbow Powerhouse, the North Fork American River below the confluence with the Middle Fork American River; the lower American River below Nimbus Dam to its confluence with the Sacramento River; the lower Sacramento River (below confluence with the American River); and the Delta down into the SDCWA service area. The transfer water will not be stored in the San Luis Reservoir.

The analysis of the potential effects on fisheries and aquatic resources associated with the proposed action alternative was based on criteria specific to the effected waterbodies.

[3] Flows for all three months may vary 100-800 cfs with the transfer. However, due to the transfer amount of 20 TAF, flows can not reach 800 cfs for the entire 3 month period.

### 4.9.1 Reservoirs

To evaluate the potential effects of the proposed water transfer on reservoir fisheries, seasonal changes in storage under the No Action Alternative (i.e., without transfer) and the proposed action alternative (i.e., with transfer) conditions was examined. The values for reservoir end-of-month storage at French Meadows and Hell Hole reservoirs were determined from the PG&E monthly operations forecast. End-of-month storage at Folsom reservoir under the No Action Alternative was obtained from Reclamation's operations forecast. Differences in end of month storages between the action alternatives and the No Action Alternative were used to evaluate the potential for reduced physical habitat availability and coldwater pool volume in the Action Area reservoirs. Also, using reservoir specific area–capacity curves, estimates for storage changes were translated into relative changes in water surface evaluations. The estimated values for changes in water surface

elevations were used to examine the potential for increases in the frequency of warmwater fish nest-dewatering events.

**Cold Water Fisheries**

During the period when Action Area reservoir is thermally stratified (generally April to November), coldwater fish in the reservoir reside primarily within the reservoir's metalimnion (middle of the reservoir) and hypolimnion (near bottom) where water temperatures remain suitable. Reduced reservoir storage during this period could reduce the reservoir's coldwater pool volume, thereby reducing the quantity of habitat available to coldwater fish species during these months. Reservoir coldwater pool size generally decreases as reservoir storage decreases, although not always in direct proportion because of the influence of reservoir basin morphomentry. Therefore, to assess potential storage-related effects to coldwater fish habitat availability in French Meadows, Hell Hole, and Folsom reservoirs, end-of-month storage for each reservoir under the proposed action alternative was compared to end-of-month storage under the No Action Alternative for each month that the transfer would be occurring (July-September period). Substantial reductions in reservoir storage were considered to result in substantial reductions in coldwater pool volume and, therefore, habitat availability for coldwater fish. The criteria used to evaluate potential effects to the coldwater fisheries in Action Area reservoirs are as follows:

- Decrease in reservoir storage, which also would reduce the coldwater pool, relative to the No Action Alternative, of sufficient magnitude or duration to adversely affect coldwater fish during the July to September period.

**Warmwater Fisheries**

Because warmwater fish species in reservoirs (including black bass, largemouth bass, smallmouth bass, spotted bass, green sunfish, crappie, and catfish) use the warm upper layer of the reservoirs and nearshore littoral habitats throughout most of the year, seasonal changes in reservoir storage, as it affects reservoir water surface elevation (feet mean sea level), and the rates at which water surface elevation change during specific periods of the year, can directly affect the reservoir's warmwater fish resources. Reduced water surface elevations can potentially reduce the availability of nearshore littoral habitats used by warmwater fish for rearing, thereby potentially reducing rearing success and subsequent year-class strength. In addition, decreases in reservoir water surface elevation during the primary spawning

period for warmwater fish nest building may result in reduced initial year-class strength through warmwater fish nest "dewatering."

Given the differences in geography and altitude among the reservoirs within the Action Area, warmwater fish spawning and rearing periods vary somewhat among reservoirs. Although black bass spawning may begin as early as February, or as late as May, in various California reservoirs, and may possibly extend to July in some waters, the majority of black bass and other centrarchid spawning in California occurs from March through May (Lee 1999; Moyle 2002). However, given the geographical and altitudinal variation among the Action Area reservoirs, in order to examine the potential of nest dewatering events to occur, the warmwater fish-spawning period is assumed to extend from March through June. Since this time frame is outside the Proposed Action Alternative transfer time frame, no further analysis was conducted on the potential for nest dewatering to occur. Additionally, to encompass all reservoirs included in the Action Area, the period of April through November is appropriate for assessing effects on warmwater juvenile fish rearing.

To evaluate potential effects, under the action alternative relative to the No Action Alternative the following criteria are used to evaluate potential effects on largemouth bass, smallmouth bass, and ultimately warmwater fish, in general:

- Additional decreases in water surface elevations of sufficient magnitude from July through September to appreciably reduce the availability of nearshore littoral habitats used by warmwater fish for rearing, thereby potentially reducing rearing success and subsequent year-class strength of warmwater juvenile fish rearing under the action alternative relative to the No Action Alternative.

### 4.9.2 Rivers

Instream flow and water temperature are important parameters related to the production and condition of aquatic resources in riverine environments. Instream flow, and the magnitude and duration of flow fluctuation events, may affect fish populations, particularly salmonid populations, by determining the amount of available habitat or altering the timing of life history events (e.g., spawning). Rapid changes in flow have the potential to affect the survival of eggs and alevins by exposing redds, and rapidly receding flow conditions may strand juveniles in pools and side channels or on beach substrates where desiccation, rapidly increasing water temperature, and predation may affect overall survival. In addition, water temperatures influence metabolic, physiologic, and behavioral patterns, as well as fecundity and overall spawning success of fish populations (SWRI 2003).

The general criteria used to evaluate potential effects to fisheries and other aquatic resources in the Action Area rivers are as follows:

- Decrease in river flows or increase in water temperatures, under the proposed action alternative relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce the habitat suitability of river fisheries and aquatic resources, or result in redd dewatering or juvenile stranding.

All the releases for this transfer out of the Middle Fork Project reservoirs travel through manmade tunnels with a capacity of 1,000 cfs. The transfer water will be released to the Middle Fork of the American River through Oxbow Powerhouse at Ralston Afterbay. As the map indicates (Figure 4.3-1), water from French Meadows Reservoir travels through the French Meadows-Hell Hole tunnel and generates power. From the Hell Hole Reservoir water travels down the long series of tunnels and powerhouses depicted until it reaches the river at the Middle Fork (MF) of the American River at the Ralston Afterbay. There will be no change in flows in any of the streams or creeks between French Meadows and Hell Hole reservoirs and Ralston afterbay; for example, in the MF American river below French Meadows Reservoir or in the Rubicon river below Hell Hole Reservoir, down to Ralston Afterbay reservoir.

In the lower American and Sacramento rivers, evaluation of potential effects resulting from changes in river flows and water temperature under the action alternative relative to the No Action Alternative focused on the species of primary management concern (e.g., anadromous salmonids and green sturgeon). Because anadromous salmonids (i.e., winter-run Chinook salmon, spring-run Chinook salmon, fall/late fall-run Chinook salmon, and Central Valley steelhead) are known to use the lower American River and Sacramento Rivers during discrete time periods associated with specific lifestages, potential effects were evaluated using species-specific assessment parameters, where appropriate.

The effects analysis focused on determining potential effects to anadromous salmonids because their life history requirements are generally more restrictive than those of other fish species found in the rivers. Thus, if anadromous salmonids are not affected by the action alternative relative to the No Action Alternative, it is unlikely that other, less sensitive fish species (e.g., splittail, American shad and striped bass) would be affected. The criteria used to evaluate potential effects on anadromous salmonids in the lower American River and the Sacramento River below its confluence with the American River, are as follows:

- Decrease in river flows or increase in water temperatures, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to notably reduce the suitability of habitat conditions during adult immigration.
- Decrease in river flows or increase in water temperatures, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce spawning habitat availability and incubation.
- Decrease in flow and associated decrease in stage, under the action alternative relative to the No Action Alternative, of sufficient magnitude or duration to notably increase redd dewatering or juvenile stranding.
- Decrease in flow or increase in water temperature, under the action alternatives relative to the No Action Alternative, of sufficient magnitude or duration to appreciably reduce the suitability of habitat conditions during juvenile rearing.

In the Sacramento River, similar considerations were included in the effects assessment for green sturgeon.

#### 4.9.2.1 Proposed Action Alternative

**Middle Fork American River**

Operations of the MFP under existing conditions currently result in highly variable flows on a daily and weekly basis from the point where the water is released on the the Middle Fork American River (at Oxbow Powerhouse) to Folsom Reservoir. The overall general increased discharge under the action alternative, relative to the No Action Alternative, would result in a temporal increase in exposure to higher average daily flows from July through September 2009. The increased flow, at the point where the transfer water is released to the Middle Fork of the American River from Oxbow Powerhouse at Ralston Afterbay dam, could enhance instream habitat conditions for rainbow and brown trout, a primary component of the coldwater fishery in the Middle Fork American River. Also, changes in the flow regime associated with the action alternative relative to the No Action Alternative could increase the forage base of fish species in the Middle Fork American River. Periodic dewatering of the stream margins during hydroelectric peaking operations has been shown to limit the ability of aquatic invertebrates to colonize these areas and achieve the densities that occur in areas that are constantly submerged (Gislason 1985). Differences in flow regime may provide a partial explanation for somewhat higher aquatic invertebrate diversity (taxa richness) in the control reaches where flows are relatively stable during the summer and fall. Aquatic invertebrates such as stoneflies, which may contribute to the forage base for fish, are more likely to successfully colonize and reproduce in an environment with more stable flow conditions. Regulated stream flows under the proposed action alternative would not fluctuate beyond existing minimum and maximum ranges. Therefore, no effects to aquatic macroinvertebrate habitat availability are anticipated, relative to the No Action Alternative. The increased flow releases under the proposed action alternative would not increase the magnitude of flows in the Middle Fork American River and therefore, would not affect benthic macroinvertebrate assemblages, relative to the No Action Alternative. Also, the magnitude or velocity of flow releases under the action alternative would not increase above current peaking levels; therefore, there is no additional risk of potentially disrupting or displacing benthic macroinvertebrates or suitable habitat, relative to the No Action Alternative.

It is anticipated that the released water temperatures from Oxbow Powerhouse would not notably change with the implementation of the proposed action alternative relative to the No Action Alternative. Therefore, it is expected that water temperatures in the Middle Fork American River below Oxbow Powerhouse would not noticeably change with the implementation of the action alternative, relative to the No Action Alternative.

In conclusion, changes in flow and water temperature from July – September 2009, as attributed to the water transfer (i.e., Proposed Action Alternative) would not result in appreciable effects to fisheries and aquatic resources in Middle Fork American River relative to the No Action Alternative.

**Hell Hole Reservoir** Under the Proposed Action Alternative, storage at Hell Hole Reservoir would be reduced during July-September 2009, relative to the No Action Alternative. Storage would decrease by up to 20,000 AF by the end of September 2009 based on information provided by PCWA. Under the No Action Alternative, end of September storage is expected to be approximately 104,100 AF, and 84,100 AF under the Proposed

Action Alternative. Under the Proposed Action Alternative, storage in Hell Hole Reservoir would remain well within historical ranges, and above FERC minimum specified storage levels.

***Coldwater Fisheries*** Hell Hole Reservoir supports coldwater recreational fisheries for resident rainbow and brown trout, and may also support lake trout and Kokanee salmon populations. The anticipated decreases in reservoir storage would not be expected to notably affect the reservoir's coldwater fisheries because: (1) coldwater habitat would remain available within the reservoir during all months of the April through November period; (2) physical habitat availability would not be substantively reduced; and (3) anticipated seasonal reductions in storage would not be expected to notably affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage under the Proposed Action Alternative relative to the No Action Alternative would not result in effects to coldwater fish resources in Hell Hole Reservoir.

***Warmwater Fisheries*** Warmwater fisheries also are reported to exist in Hell Hole Reservoir, including smallmouth bass, catfish, and sunfish. Fish production in the reservoir is believed to be limited by relatively cold water temperatures and large seasonal fluctuations in water levels and low productivity compared to natural lakes (Jones and Stokes 2001).

Under the No Action Alternative, end of September 2009 storage is expected to be approximately 104,100 AF, and 84,100 AF under the Proposed Action Alternative. Application of area-capacity curves indicates that this 20,000 AF storage reduction would correspond to an approximate reduction in the end of September 2009 water surface elevation of 25 feet. However, the spawning period for warmwater fish is believed to generally extend from March through June.

Anticipated reductions in water surface elevations associated with the Proposed Action Alternative relative to the No Action Alternative would not be expected to be of sufficient magnitude or duration to notably affect the April through November availability of nearshore littoral habitats used by warmwater fish for rearing. Consequently, potential reductions in water surface elevations under the Proposed Action Alternative relative to the No Action Alternative would not be expected to appreciably affect the warmwater fisheries in Hell Hole Reservoir.

**Lower American River**

The total transfer release under the Proposed Action Alternative would be approximately 100-800 cfs higher from July through September 2009 than flows expected under the No Action Alternative on the lower American River below Nimbus Dam. Following is a discussion of potential effects to various fish species/life stages associated with these changes in flow.

In addition to flow, water temperature is an important consideration for the lower American River, particularly for fall-run Chinook salmon and Central Valley steelhead. Seasonal releases from Folsom Reservoir's coldwater pool influence thermal conditions for the lower American River. Folsom Reservoir's coldwater pool oftentimes is not large enough to allow for coldwater releases during the warmest months (i.e., July through September) to provide

maximum thermal benefits to steelhead, and coldwater releases during October and November for fall-run Chinook salmon immigration, spawning, and incubation. This year several significant rain events in April and May have lead to the favorable lake storage and cold-water pool conditions that will enable a 68ºF temperature target at Watt Avenue to be met throughout the season, while also reserving some cold water for the fall-run Chinook salmon.

It is presently anticipated that during November 2009, hydropower generation releases would be bypassed by not drawing water from the power penstock intake structure; rather, water would be released from Folsom Reservoir via the lower river outlets to access the relatively cold, hypolimnetic water for fall-run Chinook salmon spawning.

**Adult Fall-run Chinook Salmon/Steelhead Immigration** Adult upstream immigration of fall-run Chinook salmon generally occurs from August through December, whereas steelhead adult immigration generally occurs from December into March, which includes the period of changes in flow released from Nimbus Dam associated with the Proposed Action Alternative relative to the No Action Alternative. The increased flow rates associated with the Proposed Action Alternative relative to the No Action Alternative in the lower American River below Nimbus Dam would not be expected to reduce the attraction of adults immigrating into the lower American River, nor be of sufficient magnitude to encourage additional straying into the lower American River. Although physical passage impediments are not believed to occur in the lower American River, increased flows (100-800 cfs) associated with the Proposed Action Alternative have the potential to facilitate the upstream migration of adult fall-run Chinook salmon and steelhead.

It is anticipated that the release water temperatures from Nimbus Dam would not appreciably change with the implementation of the Proposed Action Alternative relative to the No Action Alternative. Therefore, it is expected that water temperatures in the lower American River would not noticeably change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

During the adult fall-run Chinook salmon and steelhead adult immigration periods potentially affected by the Proposed Action Alternative relative to the No Action Alternative, changes in river flow or water temperature of sufficient magnitude or duration would not occur in the lower American River to affect adult immigration.

**Adult Fall-run Chinook Salmon Spawning and Egg Incubation** Fall-run Chinook salmon spawning in the lower American river generally occurs from October to December; outside the time frame of the proposed transfer (Action Alternative).

Also, the increase in inflow to Folsom Reservoir during July-September under the Proposed Action Alternative relative to the No Action Alternative is not expected to significantly affect the coldwater pool availability in Folsom Reservoir, nor affect the efficacy of the anticipated hydropower bypass release during fall 2009. It is anticipated that the boundary condition release water temperatures from Nimbus Dam would not notably change with the implementation of the Proposed Action Alternative relative to the No Action Alternative. Therefore, it is expected that water temperatures in the lower American River would not

notably change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

Examination of the cumulative redd depth distribution included in the IFIM study conducted by USFWS (2003) indicate that the shallowest fall-run Chinook salmon redds were located in about 0.4 feet (about 5 inches) deep water. Therefore, change in stage associated with cessation of the Proposed Action Alternative transfer period would not expected to dewater any fall-run Chinook salmon redds.

During the adult fall-run Chinook salmon adult spawning and egg incubation period potentially affected by the Proposed Action Alternative relative to the No Action Alternative, river flow fluctuations or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to appreciably affect adult fall-run Chinook salmon spawning and egg incubation.

**Adult Steelhead Spawning and Egg Incubation** In the lower American River, steelhead spawning generally extends from late-December to April. Therefore, steelhead spawning and egg incubation does not have the potential to be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Juvenile Fall-run Chinook Salmon and Steelhead Rearing and Emigration** The juvenile fall-run Chinook salmon rearing and emigration period extends from late-December into June. Therefore, juvenile fall-run Chinook salmon rearing and emigration do not have the potential to be appreciably affected under the Proposed Action Alternative relative to the No Action Alternative.

The primary period of steelhead smolt emigration occurs from March through June (Castleberry et al. 1991). It has been reported that steelhead move downstream as young-of-the-year (YOY) in the lower American River (Snider and Titus 2000b) from late-spring through summer. Nonetheless, some juvenile steelhead rearing is believed to occur year-round in the lower American River.

The increased flow rates associated with the Proposed Action Alternative from July through September 2009 relative to the No Action Alternative in the lower American River below Nimbus Dam would not be expected to increase the amount of habitat available for juvenile steelhead rearing. From July to September, it is expected that water temperatures in the lower American River would not change with the implementation of the Proposed Action Alternative, relative to the No Action Alternative.

At the end of the Proposed Action Alternative water transfer period flows may be decreased 100-800 cfs which would correspond to a stage reduction. Stage reductions can be bracketed depending on the beginning and ending release amounts as follows: if releases begin at 4,000 cfs an 800 cfs reduction would drop the stage 0.4 foot and a 100 cfs reduction would drop the stage by 0.04 foot (from Fair Oaks gauge rating). Whereas, if releases begin at 2,500 cfs an 800 cfs reduction would drop stage by 0.59 foot and a 100 cfs reduction would drop stage by 0.06 foot. These change in stage would not be expected to result in juvenile

stranding, particularly because steelhead present during this time of year would be expected to be larger individuals with increased swimming capability.

During the juvenile steelhead rearing period potentially affected by the Proposed Action Alternative relative to the No Action Alternative, river flow decreases or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to affect juvenile steelhead rearing.

**American Shad** American shad immigration generally occurs from April through June, with corresponding spawning and egg incubation occurring from mid-May through June. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, American shad would not be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Striped Bass** Striped bass spawning, embryo incubation, and initial rearing period may begin in April, but generally peaks in May and early-June. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, striped bass spawning, embryo incubation, and initial rearing period would not be affected under the Proposed Action Alternative relative to the No Action Alternative. In the lower American River, sub adult and adult striped bass have been observed opportunistically foraging during other months of the year. However, because flows under the Proposed Action Alternative relative to the No Action Alternative would not appreciably change throughout the year, striped bass would not be notably affected under the Proposed Action Alternative relative to the No Action Alternative.

**Sacramento Splittail** Sacramento splittail spawning, egg incubation, and initial rearing can occur between late February and early July, but peak spawning occurs in March and April. Because flows under the Proposed Action Alternative relative to the No Action Alternative would not change during this time period, Sacramento splittail spawning, embryo incubation, and initial rearing would not be affected under the Proposed Action Alternative relative to the No Action Alternative.

**Other Fish Species** The life history requirements of anadromous salmonids are generally more restrictive than those of other fish species found in the river. Thus, if anadromous salmonids are not notably affected by the Proposed Action Alternative relative to the No Action Alternative, it is unlikely that other, less sensitive fish species would be appreciably affected. Because river flow decreases or water temperature increases of sufficient magnitude or duration would not occur in the lower American River to appreciably affect anadromous salmonids, as well as American shad, striped bass and Sacramento splittail, other fish species in the lower American River also would not be appreciably affected under the Proposed Action Alternative relative to the No Action Alternative.

**Folsom Reservoir**

Under the Proposed Action Alternative, Folsom Reservoir storage would increase relative to the No Action Alternative by up to 20,000AF during July through September 2009. End of September 2009 storage in Folsom Reservoir is expected to be about 500,000 AF under both the No Action Alternative, and the Proposed Action Alternative.

**Coldwater Fisheries** The anticipated increase in reservoir storage would not be expected to notably affect Folsom Reservoir's coldwater fisheries because: (1) coldwater habitat would remain at the same or slightly higher levels within the reservoir during all months of the transfer period; (2) physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations; and (3) anticipated seasonal changes in storage would not be expected to notably affect the primary prey species utilized by coldwater fishes. Therefore, changes in end-of-month storage under the Proposed Action Alternative relative to the No Action Alternative would not result in notable effects to coldwater fish resources in Folsom Reservoir.

**Warmwater Fisheries** Folsom Reservoir's warmwater fish species (e.g., bass, sunfish, crappie, and catfish) utilize the warm upper layer of the reservoir and nearshore littoral habitats throughout much of the year. Changes in reservoir storage, as it affects reservoir water surface elevation can affect the reservoir's warmwater fisheries resources. Reduced water surface elevations can reduce the availability of nearshore littoral habitats used by warmwater fishes for spawning and rearing. Under the Proposed Action Alternative, storage is expected to only temporarily increase by up to 20,000 AF in the July to September 2009 period relative to the No Action Alternative and therefore, no significant affects to the warmwater fisheries are anticipated.

**Sacramento River**
John, please look at the segments in the example EA provided and include that information on fisheries which is applicable to the lower Sacramento segment.

**Sacramento-San Joaquin Delta**
Changes in flows in the lower American and Sacramento rivers, or export pumping would not be significant in the July to September period. Delta smelt and other fish of concern are not located in the South Delta region near the export pumps at this tmie of year. D 1641 Delta outflow and salinity requirements would be met for protection of the beneficial uses in the Delta.

## 4.10 Cultural Resources

The term cultural resource's is used to describe archaeological sites, illustrating evidence of past human use of the landscape; the built environment, represented by structures such as dams, roadways, and buildings; and traditional resources, including, but not limited to, structures, objects, districts, and sites. A cultural resource that is greater than 50 years old qualifies for consideration as a historic property. Historic properties are defined as those cultural resources listed, or eligible for listing, on the National Register of Historic Places. The criteria for National Register eligibility is outlined at 36 CFR Part 60.4.

The National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.), is the primary Federal legislation that outlines the Federal Governments' responsibility to consider the affects of their actions on historic properties. The 36 CFR Part 800 regulations that implement Section 106 of the NHPA describe how Federal agencies address these effects. Additionally, Native American human remains, cultural objects, and objects of cultural patrimony are protected under the Native American Graves Protection and

Repatriation Act of 1990 (25 USC 32) and its implementing regulation outlined at 43 CFR Part 10. The Archaeological Resources Protection Act of 1979 (16 USC 470aa), as amended, and its implementing regulations at 43 CFR 7, protects archaeological resources on Federal land.

The proposed action involves existing Federal facilities that will not require additional modification, or result in new construction, and has no potential to affect historic properties pursuant to the regulations at 36 CFR Part 800.3(a)(1), thus no additional consideration under Section 106 of the National Historic Preservation Act is required.

**No Action**
Under the No Action Alternative, there would be no impacts to cultural resources since conditions would remain the same as exiting conditions.

**Proposed Action**
The proposed action involves redistributing water through existing Federal facilities. There will be no modification of water conveyance facilities and no activities that would result in new construction. There will be no impacts to cultural resources.